

MASSACHUSETTS

AGRICULTURAL JOURNAL.

VOL. IV.

JULY, 1817.

No. IV.

[If ever agriculture is to become in fact a science, and to have established rules for the guidance of the farmer, there must be, as a preparatory step, less backwardness among intelligent husbandmen in communicating the fruits of their experience for general information. Nothing but experiment, and the comparison of a great many results, with a due consideration of the various circumstances attending them, will give any certainty to our knowledge, and a security against ruinous mistakes. If but a small portion of our active farmers would make one judicious experiment in a year, in some one branch of husbandry, and communicate an accurate account of such experiment for publication in our repository, we may venture to affirm that this work would become in a few years the farmer's *manual*, replete with important facts, and such general inferences fairly deducible from them, as would go far to furnish the necessary data, for calculating the profits on agriculture in all its different branches. In our present number will be found an account of a simple apparatus for facilitating the operation of heavy ploughing, with testimonials of its utility, which will be thought, we think, entirely satisfactory.]

[See Plate, fig. 1.]

DESCRIPTION OF MR. LUKE JOHNSON'S APPARATUS, TO
FACILITATE PLOUGHING.

THE machine consists of a pair of wheels, which may be from four and a half to five feet in diameter. The axletree, which connects the wheels, is a piece of square timber of sufficient length to pass through the boxes in the hubs of the wheels, and leave three feet and two inches between the inside boxes of the two wheels, and the sides of the axletree from three to four inches

wide. On this axletree the beam or tongue, by which the machine is moved, is placed and fastened. This beam or tongue consists of two pieces of square timber, one thirteen feet and six inches long, the other six feet long, and the sides of each from three to four inches wide. The shorter piece is framed into the longer, about eight feet six inches from that end which is next the plough, extending obliquely from the longer piece and forming an angle with it, so that the two pieces, thus framed together, may be placed on the axletree in the following manner, to wit; the longer piece to form a right angle with the axletree, to be placed on it about two inches from the hub of the off or right wheel, and the end extending back three feet and eight inches from the axletree; the shorter piece to be placed on the axletree within two inches of the hub of the near or left wheel, and the end extending back of the axletree three or four inches. These pieces, thus framed together, and thus placed on the axletree, are to be fastened to it by pins driven through them into the axletree. On the beam where the two pieces are framed together, is placed a square block, eight inches long, and the sides eight inches wide, which is fastened to the two pieces of the beam by pins, and another block long enough to reach from one piece of the beam to the other, the sides, two inches wide, is placed on the two pieces across the beam, about five inches forward of the axletree, and fastened to the beam by pins.

The end of the plough to be drawn by the machine, should be a sufficient distance from the axletree of the wheels to give it the proper depth in the ground. A chain or several chains, hooked together, and long enough to reach from the end of the plough to the end of the beam above described, is hooked to the end of the plough, and extends from thence over the two blocks aforesaid to the forward end of the beam. The chain thus presses upon the blocks, which causes a pressure upon the wheels. This chain is kept in place by a small chain put round it and the beam, a few inches forward where the two pieces are framed together. This machine may be drawn by a pair of oxen or horses, the end of the chain being hooked into the staple of the yoke, and the end of the beam put into the ring and held by a pin. The plough by this means is drawn with one fourth less power than without it,

and kept more easily and steadily in the furrow. And by putting a short chain round the beam, next the plough and near the end, and extending it round the chain, it will, when the team turns the plough round with it, save the labour of carrying the plough round.

It is not necessary that the pieces, constituting the beam or tongue, should be of the exact length or size above described, but the above proportion should be observed.

JOHN GARDNER,
ABIJAH BIGELOW.

RESULT OF AN EXPERIMENT WITH JOHNSON'S APPARATUS.

Brighton, May 7, 1817.

DOCTOR AARON DEXTER,

DEAR SIR,

Mr. Luke Johnson, of Leominster, the bearer of this, is the gentleman who applied last fall at the Cattle Show, to have his improvement tested for propelling the plough with less power than in the usual method; his plan is to pass the chain over a short axle fitted to two chaise or tight waggon wheels, and over a block of seven inches high, fixed on the tongue which is placed on one side the axis, within two inches of the inner edge of the hub of the wheel on the off side. You will recollect you invited him to be at Brighton on the day the Trustees were to dine with me. He accordingly attended, but the violent rain on that day prevented making any trial, for which he was fully prepared. Last week, on his way through this town, he saw my men engaged in breaking up sward land, and his machinery being here, he wished me to make trial of it. I readily consented, and we used it two days, until we had finished breaking up. I invited some of my most intelligent neighbours to attend, and we were all of opinion that there was a saving of one quarter of the power by his method, and that it was much easier for the man who held the plough, and that there was less difficulty in laying the furrows smooth than with the common plough. In the eastern country, fixing the chain to the axle of a cart, and putting the cattle on the tongue, has been practised for many years, and is usual even for drawing a log that is too heavy for the team, when

pulling by the chain leading from the log to the yoke. Mr. Johnson's improvement consists in having a short axle fixed to two tight wheels, the tongue on one side, and a block of seven inches on the tongue over which the chain passes; the block serves to lengthen the lever, and of course increases the power in that ratio, the tongue or beam being on one side, and on the off side directs the off wheel in the furrow, while the other is on the grass. How far his method would answer in rough and rocky ground, or when trees stand irregularly, I do not pretend to judge. Mr. Johnson is very confident that in rough and rocky ground, and when stumps two feet high are left upon it, his method is quite as good as when the ground is level. It is true, we ploughed with less difficulty, and laid the sward much smoother with less application of the foot than in the usual method of hooking the chain to the yoke, which we had tried one day before Mr. Johnson called on us. My neighbours, who have tried it, Mr. Johnson informs me, speak quite as favourably as I have done in this letter, which I have read to him.

With respect and esteem,

Your very humble Servant,

GORHAM PARSONS.

EXPERIMENT

TO ASCERTAIN THE BEST KIND OF INDIAN CORN, AND
TO PROCURE THE BEST SEED, BY GATHERING THAT
WHICH RIPENS EARLIEST, AND FROM THE MOST PRO-
LIFICK STALKS.

[The ensuing extract, from "the Exeter Watchman," has been thought worthy of republication in this Repository, in as much as it indicates an intelligent and very laudable attention to a subject of great importance in agriculture. There can be no doubt, that if like care in selecting all seeds was more common, a material and beneficial effect would result, both to the productiveness and the earliness of the crop. Much less attention is generally paid to the selection of seeds, than might be expected, since the intimate connexion between the quality of the seed and the quality of the crop, is a fact so necessary and so familiar.]

To collect good seeds, (says the celebrated farmer, Mr. Cooper of Pennsylvania,) consists not in procuring new seeds from distant places, as is generally supposed, but in selecting the best of one's own seeds and roots. Though Mr. Cooper continually sowed or planted them in the same soil, every article of his produce was greatly superiour to that of every other person, who supplied the market, and continued to improve. He believed that the continuing to propagate from the same vegetables, or animals, was not attended with any degeneracy, and adopted the plan with vegetables, which Mr. Blakewell pursued with equal success with animals, viz. to raise from the best individuals of the kind.

Mr. Cooper was led to the practice, by observing that vegetables, of all kinds, were very subject to change with respect to their time of coming to maturity, and other properties; but that the best seeds never failed to produce the best plants. Among a great number of experiments, he particularly mentions the following:—

About the year 1746, his father procured seeds of the long watery squash, and though they have been used on the farm ever since that time without any change, they are at this time better than they were at the first.

His early peas were procured from London in the year 1756, and though they were planted on the same place every season, they have been so far from degenerating, that they are preferable to what they were then. The seeds of his asparagus he had from New York in 1752, and though planted in the same manner, the plants were greatly improved.

It is more particularly complained of, that potatoes degenerate when they are planted from the same roots in the same place. At this, Mr. Cooper said he did not wonder, when it was customary with farmers to sell or consume the best, and to plant from the refuse; whereas, having observed, that some of his plants produced potatoes that were larger, better shaped, and in greater abundance than others, he took his roots from them only, and the next season he found that the produce was of a quality superior to any that he had ever had before. This practice he still continued, and found that he was abundantly rewarded for his trouble.

Mr. Cooper was also careful to sow the plants, from which he raised his seed, at a considerable distance from any other. Thus, when his radishes were fit for use, he took ten or twelve that he most approved, and planted them at least one hundred yards from others, that blossomed at the same time. In the same manner he treated all his other plants, varying the circumstances according to their nature.

About the year 1772, a friend of his lent him a few grains of a small kind of Indian corn, not larger than goose shot, which produced from eight to ten ears on a stalk. They were also small, and he found that few of them ripened before the frost. Some of the largest and earliest he saved, and planted them between rows of a larger and earlier kind, and the produce was much improved. He then planted from those that had produced the greatest number of the earliest ears, and that were the first ripe, and the next season the produce, with respect to quality and quantity, was preferable to any that he had ever planted before.

The method of saving seed-corn, by taking seed from the heap, is attended with two disadvantages; one is the taking the largest ears, of which, in general, only one grows on a stalk, which lessens the produce; and the other is taking ears, that ripen at different times. Many years ago, Mr. Cooper renewed all the seed of his winter grain from a single plant, which he had observed to be more productive, and of a better quality than the rest, which he is satisfied has been of great use. And he is of opinion, that all kinds of garden vegetables may be improved by the methods described above, particular care being taken, that different kinds of the same vegetables do not bloom at the same time near together, since, by this means, they injure one another.]

Communications from the Board of Agriculture, vol. 1. Letter from Dr. Priestley

[To the Editor of the Exeter Watchman.]

SIR,

I send you the following mode of procuring a good kind of Indian corn for seed, which you may publish if you think proper.

Yours, &c.

A. L.

About ten years ago, I procured all the different kinds of Indian corn, approved of by any body in this part of the country for seed. These different sorts I planted on a piece of ground, particularly appropriated to that purpose, planting two rows of each kind. The ground was all equally good and early, manured in the same way, planted at the same time, and all cultivated alike.

These different kinds of corn were in a situation, that I saw them at all stages of their growth, from the time of planting until they were fit to gather. I found there was, through the season, a very great preference to some sorts over others, in the quantity of corn and of fodder, as also in the time of their ripening, and also in the size and shape of the ears, and in the quantity of shelled corn, which could be obtained from the same ground.

From all the kinds planted (which I think was more than twenty) I selected three which I considered preferable to the rest, but not all for the same qualities. The one kind was a large twelve rowed corn, ears long, well shaped, and well filled, both between the rows, and at the end of the ear, very productive, in proportion to the ears, in shelled corn, with large and high stalks, called the Sandwich corn. Another kind, called the Pigwackett corn, twelve rowed or more, the ear well covered at the ends, and no spaces between the rows, ears rather short, stalks low, but a large number of ears to the hill. A third kind, was ten and twelve rowed, ears well covered as either of the others, stalks about the common size, and ears larger than usual. The two last kinds of corn were earlier than the common corn, about eight or ten days; the other kind, a little later than our common corn, planted in this part of the country.

These three kinds of seed I mixed together, and planted in the same field, at a distance from any other, and in the fall selected the earliest ripe ears in the field, from stalks (when it could be done) on which there were more than one ear, having regard to the size, shape, and perfection of the ear in every particular. I have continued this practice ever since, and have never failed having a good crop. The corn has become so mixed, that there has not been, for several years, a single ear, in a field of three or four acres, which does not distinctly shew each of the three kinds of corn originally planted, by the colour, shape, and size of the

kernels. The last year but little of the common corn in my neighbourhood ripened, but mine was about as large a proportion of it ripe, as usual, although I had not so large a crop.

I think by gathering my seed in the field, from the first ripe ears, the corn is ten days earlier than when first planted.

You will observe that I gather my seed from stalks, that have more than one ear, when that can be done. My reason for pursuing that course, at first, was from a general belief, in this vicinity, that some trees and plants, as well as animals, were more prolific than others, and that the descendants of those animals and seeds of plants, would partake of the nature of the parent. Whether this be true or not, I leave to philosophers to determine. My corn, since I adopted this method, has been more productive than formerly ; but whether, in any part, owing to this course, I cannot say with certainty.

Chester, March 30th, 1817.

DEAR SIR,

For several years last past, I have adopted the following method of raising Indian corn, and have found it successful. I communicate it to you, requesting your remarks, and the result of your experiments.

No soil, but a warm, dry, and good one, ought ever to be planted with Indian corn, for, although wet and cold soils, in particular seasons, may produce good crops, yet the chance is so much against getting pay for so expensive a kind of cultivation, as this crop requires on such land, in a common season, as to make it prudent always to avoid planting such land with Indian corn, and to prefer any other crop to pulverize and enrich it.

A very important thing in raising a good crop of Indian corn, is the preparation and application of the manure. I have found this a good one. Cover the bottom of your barn yard, in the fall, with mud, or any substance composed of rotten vegetable matter, from meadow land or pond holes, or with tanner's bark, and if these cannot be procured, with rich soil, turf, and wash. In one year from the time of so covering your barn yard, after the manure from the barn, droppings of the cattle, straw, &c. have been thrown upon it, and well mixed during the summer,

by ploughing or digging it several times over, take out eight cart loads for every acre you intend to plant, lay it in a square and flat heap. In the spring, hale from your hovel, or stable, five cart loads of unfermented manure, and place it upon the top of the heap you haled out in the fall. As early as the middle of April, dig over and mix the heap as composed together; if frozen, cut it up with an ax, or punch it to pieces with an iron bar, so as to mix the old and new dung together; let it lie light, and if rain does not fall so as to make it ferment, throw on water. Let your ground be well ploughed, and as soon as the dung heap becomes hot, which, in common seasons, in this part of the country, will be between the first and tenth of May, put the dung in the holes, and immediately drop and cover your corn, keeping all parts of the work as even with each other as possible. The distance I have found best, from hill to hill and row to row, is three feet nine inches. I have usually put eight or ten kernels in each hill, but allow not more than three to remain.

This method of raising corn I have practised, for seven or eight years, with little alteration. I find the heat in the manure brings the corn up early, of a good colour and vigorous growth; that the old, rotten dung affords food to the plant, in the early part of the season; at the time of earing, the new dung is reduced to a proper state to afford sufficient nourishment to the corn, to make it ear well, and the ears to be of a good size, well proportioned, and well filled out at the ends. This mode of raising corn, in description, appears much more expensive and laborious than the common way, but, in practice, it will be found to add very little, if any thing, to the common mode practised.

In hoeing corn no general rule can be given. Hoe it as often as there are weeds, and always before they seed, make hills large or small, high or low, according to the ground and season. In dry ground, and a warm season, the corn requires large and high hills. In wet ground, and a cold season, small and low hills.

Please to communicate to me your thoughts on this subject, and likewise your remarks, and experiments, if you think it worth your while to try this mode of raising this very valuable crop.

I send you a small quantity of seed corn, and will, at some future time, communicate to you the mode of mixing and preparing it.

I am, with sentiments of respect and esteem,

your humble servant,

AMOS KENT.

E. H. Derby, Esq.

Mr. Knight, an English horticulturist, has given a curious experiment in impregnating the blossoms of one variety of pea, with the farina of another. He says, treatise of apple and pear, p. 42, "Blossoms of a small white garden pea, in which the males had previously been destroyed, were impregnated with the farina of a large clay coloured kind, with purple blossoms. The produce of the seeds, thus obtained, were of a dark gray colour, but these, having no fixed habits, were soon changed by cultivation into a numerous variety of very large and extremely luxuriant white ones, which were not only much larger and more productive than the original white ones, but the number of seeds in each pod was increased from seven or eight, to eight or nine, and not unfrequently to ten. The newly made gray kinds, I found were easily made white again, by impregnating their blossoms with the farina of another white kind.

The fifth volume of the Bath papers, contains a similar experiment with beans. It is related, that a Mr. Whimpy planted a field with garden beans, in rows about three feet asunder, in the following order—mazagan, white blossom, long podded, Sandwich-token, and Windsor beans. The mazagan and white blossom were threshed first, when, to his great surprise, he found many new species of beans. Those from the mazagan were mottled black and white; the white blossoms were brown and yellow, instead of their natural black; and they were both much larger than usual.

Darwin's Phytologia, page 105.

SOFT SOAP, UNDILUTED, AN EXCELLENT CLEANSER OF
FRUIT TREES, AND DESTROYER OF INSECTS.

[To the Corresponding Secretary.]

Easton, (in Talbot County, Md.) 13th April, 1817.

SIR,

AMONG the papers published in the third number of the third volume of the Agricultural Journal of the Massachusetts Society, there appears a letter written by Richard Peters, Esq. upon the subject of Peach Trees, mentioning their decline for some years past, and the various remedies employed by him for relieving their diseases and preventing their decay. It does not appear that the Peach Trees in the neighbourhood of Boston are subject to the same disorders; but as the Society have thought proper to publish this paper for the benefit of their members and other readers in their districts, it must be presumed that the subject of it was considered worthy of their attention, and that probably the Peach Trees there are also more or less affected by casualties or distempers which it was their desire to remove or prevent. Under this impression I shall proceed to state an expedient which has been applied to the improvement of Fruit Trees in this county, and which may be equally serviceable in other portions of the country.

The Peach Trees here appear to be liable to the same disasters and diseases which are described by Mr. Peters, and they often wither and decay in the same manner. Pear Trees and other fruit trees are also frequently affected, and sometimes suddenly decay, without discovering the causes of their decline. A gentleman of this neighbourhood some years ago, observing the situation of his trees, and having unsuccessfully used many applications, at length directed their trunks or bodies to be washed and well rubbed with *Soft Soap*; and it is not easy to imagine the early change which appeared in their bark and foliage: the bark became smooth and glossy, and seemed sound and beautiful; and he thought the tree was greatly improved in every respect. I have tried the same experiment, and with equal advantage to Apple Trees, Pear Trees and Peach Trees; and am persuaded they have been greatly benefited by this pro-

cess : it is used in the Spring, and may be repeated in following years as frequently as the trees appear to require it.

Mr. Peters declares that he used *soap suds* without any beneficial effects : but it is probable that the *Soft Soap* in substance is more powerful ; and that having more strength and virtue than the suds as commonly made, it may more effectually destroy the worms, bugs, and other insects which so materially injure the trees ; and it is believed to be in consequence of their destruction that the bark and branches are enabled to derive so much improvement from the application of this substance.

I am about to suggest this expedient to Mr. Peters ; and if you think it may merit the consideration of your Society, you are at liberty to place this communication before them.

I am, Sir,

With much respect,

Your obedient Servant,

N. HAMMOND.

EXPERIMENT TO ASCERTAIN WHETHER PLUCKING THE
BLOSSOMS FROM POTATOE VINES INCREASES THE
CROP.—SOME ACCOUNT OF THE SWEDISH TURNIP.

West Springfield, April, 1817.

DOCTOR AARON DEXTER,

DEAR SIR,

I HAD full confidence in the account of increasing the crop of potatoes by plucking off the blossoms, as recommended in No. 1, of the 4th volume. I got the account published in the Springfield newspaper, and sent it to General Simon Perkins, of Warren, in the state of Ohio, who informed me he got it published in the newspapers printed at Warren. I found, after picking off all the flowers, that new sets came on, mine were picked over three times, and some of them four or five times, except two rows of twenty rods long each ; where bushes were set up to distinguish them, which were left untouched, and no blossoms taken from them.

I saw them gathered and measured. I could perceive no difference in the quantity or size of the potatoes produced on the rows where the blossoms were plucked off, or wholly left on. I

had a number of bushel baskets filled from the plucked and the unplucked rows, and I am certain the unplucked rows produced as much by measure as the plucked rows. All the information I could obtain from others, was similar to my own experience. I never have heard of any increased crop by plucking off the blossoms in any one instance, though many tried it. The last season was rather unfavourable, and produced about two thirds or three quarters of a common crop of potatoes; but I think that could not make any difference in the produce of the plucked rows. Experience must determine the fact.

In the close of the communication from East Andover, volume 3d, page 68, mention is made of a species of the Apricot, found on Kennebeck river, which produces a plentiful crop of delicious fruit. If you have any of the stones on hand, I will thank you for some of them.

I intend sending you by Mr. Leonard a bag of the Swedish Turnip Seed, which is thought preferable to our common turnip for use. It must be planted or sowed sooner than the other kinds for winter sauce, viz. from the 1st to the 15th or 20th of July. They answer very well to plant after green peas; the hills should be ten or twelve inches apart, and three or four seeds put in a hill, and should be hoed two or three times. They are a much richer sauce than common turnips, their flavour is preferred before other turnips, and they will keep good a year, and never grow pithy any more than a parsnip. Willich's Domestic Encyclopedia describes them as follows:—

“The Ruta Baga, or Swedish Turnip, is one of the most valuable roots of the kind. Its inside is either white or yellow; which colour, however, does not affect its quality. It is more hard than other kinds, and suffers no injury from the most intense cold, (meaning in England.) When it seeds near other turnips, it produces numerous varieties, &c. &c.” The size and shape is about the same as the common beet. I raised five or six quarts of the seed in my garden. I wish it distributed among all the members of the Society, and others that are willing to try it. A table spoonful will be sufficient for a trial.

With respect and esteem,

I remain your humble Servant,

JUSTIN ELY.

DESCRIPTION OF A BRUSH FOR DESTROYING CATERPILLARS' NESTS.

Wenham, May 26, 1817.

[To the Corresponding Secretary.]

DEAR SIR,

FOR the last three or four years, we have here had very few caterpillars. Last week I observed an increased number, though not many, on my young apple trees. How to destroy them *most easily*, was a question which occurred as often as I had seen orchards infested with them: while I always considered it disgraceful to a farmer to suffer his trees to be stripped of their leaves, and their fruit, for that season at least, to be destroyed; seeing it was very practicable to get rid of them, and without much trouble, by crushing them, when small, with the fingers. This was my father's mode, when I was a boy. The same long, light ladders, which served in autumn in gathering his winter fruit by hand, enabled one to come at most of the caterpillars nests in the spring. On this effectual example I have myself practised, since I became a farmer. Some over delicate persons might object to this mode: but it is really far less offensive than the bare sight of large and numerous nests with which apple trees are sometimes filled. And if the operation be performed early, when the caterpillars are only from a quarter to half an inch long, the operator (man or boy) will feel no repugnance to the process. But in full grown trees, some nests, towards the extremities of their small limbs would escape, because not accessible by ladders. A narrow brush, formed with small bunches of bristles in a single row, I once thought might reach and destroy them; but it was not found effectual nor convenient. Last Saturday morning the idea of the proper kind of brush occurred to me, and, in the forenoon I tried it with complete success.

I presume every farmer has observed, that the clusters of eggs producing caterpillars, are laid round the slender twigs of the apple tree and wild cherry, and effectually guarded by a gummy covering, until vegetation commences in the ensuing

spring. When first hatched, the worms appear about the eighth of an inch long. The same warmth in the air which opens the buds, hatches the caterpillars to feed on the embryo leaves. Their first object is to provide for themselves a tent for shelter, in their new state, against the inclemencies of the weather. For this purpose, they crawl to a small fork of a limb, where the branches form a sharp angle; and there spin and weave a web with which they surround it, and where they are secure against undue cold and heat and rain. By this small white web they are discovered, and are then most easily destroyed. But the clusters of eggs are not all hatched at the same time. According to their situation for warmth or coolness, they are hatched some days earlier or later. At the distance, therefore, of a week or ten days after the first visit, an orchard should be again inspected, and all the latter broods destroyed. If neglected in this first state, they soon, by their growth, become straitened for room; and having also consumed the nearest forage, they march and take a new station, and there form a new, but more ample tent. By such neglect the mischief of their ravages is increased, and they are with more difficulty destroyed.

The efficient and convenient instrument above mentioned, for this work, is nothing more than a common bottle brush fastened on the end of a pole. Having an old one in my house, I was enabled to make the experiment on the day when the idea of so applying it occurred to me. This brush is made of hogs bristles, introduced between two stiff wires closely twisted: and being convenient in cleaning the insides of bottles, is probably familiarly known whenever liquors are bottled. For the information of others, I will mention, that a piece of wire full one tenth of an inch in diameter, about three feet long, doubled, and leaving a small loop in the middle, is closely twisted for the length of about eight or ten inches from the loop; and then the bristles, being introduced between the remainder of the two branches of the wire, and these closely twisted upon them, the bristles are immovably fixed; and thus form (after being uniformly sheared) a cylindrical brush about six inches long and two inches and a half in diameter. To fasten this conveniently to a pole, with a small gouge I made a groove about seven or eight inches long at the small end of the pole, in which nearly all the handle (the

naked portion of the twisted wire) of the brush was laid, and bound on with three strings.

In using the brush, press it on the small nest, and turning the pole in the hand, the web is entangled with the bristles, and removed: otherwise, you rub the fork of the limb, inside and outside, with the brush, when nest and worms are surely killed or brought down. That the experimenter may see its mode of operation, he may apply the brush with his hand to a nest within his reach. Spruce poles are eligible, because that wood is light and stiff. For my small trees, I found a common bean pole (used for running beans to climb on) six or seven feet long, sufficient: and for them a longer pole would be inconvenient. For taller trees, poles proportionably long must be provided.

If you are satisfied, by my account, of the utility of this simple instrument for destroying caterpillars, you may think it proper immediately to make it publickly known. Should the description be more minute than is requisite for communicating a clear idea of it, and of its application, you will abridge it.

With very great respect and esteem,

I am, dear Sir, truly yours,

TIMOTHY PICKERING.

ON UNFERMENTED MANURES.

[Extract of a Letter from the Hon. Richard Peters, of Pennsylvania, to Josiah Quincy, Esq.]

IN No. 1, Vol. IV. of the Massachusetts Agricultural Repository, you have commenced with extracts from Sir H. Davy's Elements of Agricultural Chemistry, in which there are, for the most part, subjects of high importance to those who investigate principles. But, in many of his positions, I cannot agree with him. Not from the vanity of opposing his opinions as a chemist or philosopher, but in the humility of a practical farmer. In no article do I differ with him more than in his ideas of unfermented, or very slightly fermented dung. It is not because I have long cherished and frequently promulgated the contrary doctrine, but because I have had experience during a period of fifty years, which

has fixed my convictions. Some of our hot muck farmers have assailed me in the less tenable points.—In one, in which I insist that *all* the hot muck ferments over violently in the earth. They say (and so does Sir H. I believe) that the earth checks fermentation. And so it may, to a certain degree. But strawy muck cannot be regularly spread. The animal matter is not mixed with the straw, but lies in masses *per se*; this over ferments, and throws up your crop, in bunches, or spots, over luxuriantly; and it lays, smuts, or mildews. The earth prevents fermentation in the straw; and this dry rots and becomes a *caput mortuum*. I have experienced this effect over and over again. I do not believe in the alleged economy of the hot muck practice. I think reasonably fermented dung goes further. All the straw and additional matter is impregnated, and, being decomposed, spreads with the animal ejections more equally, and to infinitely better advantage, assisting your crop in more points, and operating equally and more efficiently on the whole.*

LETTER FROM MR. JEFFERSON TO T. DALTON, ESQ.

Monticello, May 2d, 1817.

DEAR SIR,

I AM indebted for your favour of April 22d, and for the copy of the Agricultural Magazine it covered, which is, indeed, a very useful work. While I was an amateur in agricultural science (for practical knowledge my course of life never permitted me,) I was very partial to the drilled husbandry of Tull, and thought still better of it when reformed by Young, to twelve inch rows; but I had not time to try it when young, and now, grown old, I have not the requisite activity either of body or mind.

With respect to the field culture of vegetables for cattle, instead of the carrot and potatoe, recommended by yourself and the magazine, and the beet by others, we find the Jerusalem artichokes best for winter, and the succory for summer use.

* It is an indisputable fact, that hot or fresh dung is ruinous to tap rooted plants. Beets, carrots, parsnips, grow hairy, tough, and often forked, in contact with hot or fresh dung.

This last was brought over from France to England, by Arthur Young, as you will see in his travels through France, and some of the seed sent by him to General Washington, who spared me a part of it. It is as productive as the lucern, without its laborious culture, and, indeed, without any culture, except keeping it clean the first year. The Jerusalem artichoke far exceeds the potatoe in produce, and remains in the ground through the winter to be dug as wanted.

A method of ploughing our hill sides horizontally, introduced into this most hilly part of our country, by Col. J. M. Randolph, my son-in-law, may be worth mentioning to you; he has practised it a dozen or fifteen years, and its advantages were so immediately observed, that it has already become very general, and has entirely changed and renovated the face of our country. Every rain, before that, while it gave temporary refreshment did permanent evil, by carrying off our soil, and fields were no sooner cleared than wasted. At present we may say, that we lose none of our soil, the rain not absorbed in the moment of its fall, being retained in the hollows between the beds until it can be absorbed.

Our practice is, when we first enter on this process with a rafter level of ten feet span, to lay off guide lines conducted horizontally around the hill, or valley, from one end to the other of the field, and about thirty yards apart. The steps of the level, on the ground, are marked by a stroke of the hoe, and immediately followed by a plough to preserve the trace. A man, or a lad, with the level, and two small boys will do an acre of this in an hour, and, when done, it remains forever. We generally level a field the year it is put into Indian corn, laying it in beds of six feet wide, with a large water furrow between the beds, until all the fields have been once levelled. The intermediate furrows are run by the eye of the ploughman. Governed by these guide lines, the inequalities of the declivity in the hill will vary in places the distance of the guide lines, and occasion gores which are thrown into short beds. As in ploughing very steep hills horizontally, the common plough can scarcely throw the furrows up hill, Col. Randolph has contrived a very simple alteration of the share which throws the furrow down hill, both going and coming. It is as if two *shares* were welded together

at their straight side, and at a right angle with each other. This turns on its bar as on a pivot, so as to lay either share horizontally; then the other, becoming vertical, acts as a mould board. This is done by the ploughman, in an instant, by a single motion of the hand at the end of every furrow. I inclose a bit of paper, cut into the form of the double share, which, being opened at the fold to a right angle, will give an idea of its general principle. Horizontal and deep ploughing, with the use of plaster and clover, which are but beginning to be used here, will, as we believe, restore this part of our country to its original fertility, which was exceeded by no upland in this state. Believing that some of these things might be acceptable, I have hazarded them as testimonies of my great esteem and respect.

TH. JEFFERSON.

Tristram Dalton, Esq.

ACCOUNT OF PRODUCE OF MILK AND BUTTER FROM A COW, IN ENGLAND, FOR FIVE YEARS—ALSO, MODE OF FEEDING.

[From the communications to the Board of Agriculture.]

AN account of the produce of milk and butter from a cow, the property of Mr. William Cramp, of Lewes, in the county of Sussex, for one season, commencing the first day of May, 1805, (that being the day she calved) up to the second day of April, 1806, a space of forty-eight weeks and one day.

BUTTER.	Number of Weeks.	Pounds per Week.	Quan- tity of Butter.	Sold at per pound.	Total Value.
From the 1st of May to the 7th of May { kept no account; sold the calf }	1			s. d.	l. s. d.
From 8th of May to the 25th of June	7	15	105	1 6	7 17 6
From 26th of June to the 10th of Sept.	11	14	154	1 6	11 8 0
From 11th of Sept. to the 29th of Oct.	7	12	84	1 6	6 6 0
From 30th of Oct. to the 3d Feb. 1806	14	10	140	1 6	10 10 0
From 4th of Feb. to the 10th of March	5	8	40	1 6	3 0 0
From 11th of March to the 24th of March	2	7	14	1 6	1 1 0
From 25th of March to the 2d of April, { left off milking }	1	3	3	1 6	0 4 6
	48	—	540	—	41 14 0
Deduct for butter sold in the month of { August, 1s 4d per lb. only for 3 weeks }					0 7 0
					41 7 0

Milk.

	Quarts per Day.	Quarts.
From the 8th of May to the 25th June	20	980
From the 26th June to 10th Sept.	18 1-2	1424
From the 11th Sept. to 29th Oct.	16	785
From the 30th Oct. to 3d Feb. 1806	12	1176
From the 4th Feb. to 10th March	11	385
From the 11th March to 24th March	9	126
From the 25th of March to the 2d April	5	45
		<hr/> 4921
The milk, being measured when milked from the cow, there must be deducted for cream		540
		<hr/> 4381

Four thousand three hundred and eighty-one quarts of skim milk, at one penny per quart	<i>l.</i>	<i>s.</i>	<i>d.</i>
	18	5	1
Made in the course of the season, four large waggon loads of manure, worth fifteen shillings per load, thoroughly rotten	-	-	-
	3	0	0
	<hr/> 62	12	1
Total expense	21	6	2
	<hr/>		
Profit	<i>l.</i> 41	5	11

Grains consumed the summer, twenty-six weeks, three and an half bushels per week, at 4d per bushel	<i>l.</i> 1	10	4
Bran, one and an half bushel per week, at 8d per bushel	1	6	0
Winter, twenty-six weeks, grains consumed, eight bushels per week, at 6d per bushel	5	4	0
Bran, four bushels per week, at 8d per bushel	3	9	4
Half a hundred weight of hay per week, at 5s6 per cwt.	3	11	6
Rent of the land whereon were raised the lucern, clover, carrots, &c.	15	0	
	<hr/> 4. 15	16	2

Brought forward	-	-	-	-	15	16	2
To the wages of a man, at the rate of fifty-two pounds per annum, supposing him to attend ten cows, the tenth part of which is	-	-	-	-	5	4	0
To the farrier for three drinks at the time of calving					6	0	
					<hr/>	<hr/>	<hr/>
					l. 21	6	2

The cow was fed with artificial grasses, sown on the following plats of ground within the walls of the prison, containing by measurement, as follows :—

					Rod.	Perch.
No. 1.	A plat sown with red clover and rye grass, containing	-	-	-	-	0 19
No. 2.	A plat sown with lucern	-	-	-	-	0 2
No. 3.	do. sown with cow grass and white clover					0 17
No. 4.	do. sown with red and white clover				-	18
No. 5.	do. sown with lucern	-	-	-	-	0 10 1-2
No. 6.	do. sown with carrots	-	-	-	-	0 2 1-2
					<hr/>	<hr/>
						1 29

The above crops of lucern were cut four times, and the clover three times, during the season, producing, each time, good crops. The cow not allowed to feed on the grass ground, but cut and given her in a rack in her hovel, where she has a plat of about eighteen square perches to range in. I kept but this cow, nor have I had any other since I had her. She is seven years old, and has had five calves; has been in my possession two years. Consumed much less food this year than the year before.

Food and Treatment.

Summer season fed on clover, lucern, rye grass, and carrots, three or four times a day, and at noon time about four gallons of grains, and two of bran, mixed together; always observing to give her no more food than she eats up clean.

Winter season fed with hay, grains, and bran, mixed as before stated, feeding her often, viz. five or six times a day, as I see proper, giving her food when milking; keeping the manger clean where she is fed with grains; not to let it get sour; wash her udder at milking three times with cold water, winter and summer;

never tie her up; lies in or out as she likes; particularly careful to milk her regularly and clean. Milch cows are often spoiled for want of patience at the latter end of milking them.

One man would attend ten cows through the year, with the exception of an assistant at milking times. Feeding milch cows as above stated, they will, at all times, be in good condition for the butcher, if an accident should happen.

There will be no ground trampled and food spoiled by cattle running over a vast tract of land. I think cattle may be fattened by the same method of feeding, with much advantage; one fourth part of the land will feed them; a great quantity of manure be made, and the beast fattened much sooner. Cattle so fed have nothing to do, but fill themselves, and lie down to rest.

No labouring for their food. I fattened the two cows I had before this, and made them very good meat in seven weeks. I found it to answer, although I bought the food at a dear rate, giving them a little ground barley or oats, mixed with the grains or bran. I think that cows would nearly double in the course of the season their quantity of milk and butter, by following the above plan. It is unnecessary for a cow to go dry long before she calves. The thing will tell for itself; when the milk changes brackish, she should be dried off; that may be in three, four, or five weeks before she calves. Milch cows seldom go dry before, unless it is from neglect, poverty, sickness, or bad milking. Let the milk stand two days in summer, and three in winter before it is skimmed. I have stated only one penny per quart for skim milk; but I am informed, that it sells in the town of Lewes, for three half pence, it being worth one penny to put in the hog tub. I fattened two hogs in the summer, with no other food than skim milk and grains, making them very good meat, weighing sixteen or eighteen stone each, at eight pounds per stone. Where cows are kept in this way, hogs should be kept, as the milk will be in summer thick and sour, and fit for nothing else but hogs, the people of this country making no use of it as food.

The following is the pedigree of the cow in question, which I received from Mr. Holman, a respectable farmer at Bentley, in the county of Sussex.

The cow belonging to Mr. Cramp was bred by John Holman, (my father) at Bentley, in Framfield, in the county of Sussex,

from a Sussex bred cow, also bred by John Holman on the same farm. She was got by a bull bred by Mr. Colgate, at Hamstead farm, in Framfield aforesaid, the father of which bull was also bred by Mr. Colgate, for which he received a prize cup at Petworth, on the 20th day of November, 1726. She was calved in March, 1799.

N. B. Mr. Cramp's cow calved on the 19th day of April; the calf in very fine condition; the cow having been dry for seventeen days only was taken bad with the yellows, at the very time of calving, but is now recovered and going on very well. The calf sold at twelve days old for £. 1 10s.

The following is the second years account of the produce of milk and butter from a cow, the property of William Cramp of Lewes, in the county of Sussex, for this season, commencing the 19th day of April, 1806, that being the day on which she calved, up to the 27th day of February, 1807, a space of time of forty-five weeks.

BUTTER.	Number of Weeks.	Pounds per Week.	Quantity of Butter.	Sold at per Pound.	Total Value.
From the 19th of April to the 2d of May, { gave no milk, but what the calf sucked }	2			s. d.	l. s. d.
From the 3d of May to the 23d of May	3	10	30	1 4	2 0 0
From the 24th of May to the 6th of June	2	10 1-2	21	1 4	1 8 0
From the 7th of June to the 3d of Oct.	17	12	204	1 5	14 9 0
From the 4th of Oct. to the 12th of Dec.	10	10 1-2	105	1 6	7 17 6
From the 13th of Dec. to the 6th of Feb. 1807	8	9	72	1 6	5 8 0
From the 7th of Feb. to the 27th of } Feb. left off milking }	3	6	18	1 6	1 7 0
	45	—	450	—	32 9 6

Milk.

	Quarts per day.	Quarts.
From the 3d May to 23d May	- 12	252
From the 24th May to the 6th June	- 14	196
From the 7th June to the 3d Oct.	- 16	1904
From the 4th Oct. to the 12th Dec.	- 14	980
From the 13th Dec. to the 6th Feb.	- 11	616
From the 7th Feb. to the 27th Feb.	- 9	189
		<hr/> 4137

The milk being measured, when milked from the
cow, there must be deducted for cream

-	450
	<hr/> 3687

	<i>l.</i>	<i>s.</i>	<i>d.</i>
3687 quarts of skim milk at 1 <i>d.</i> per quart	-	15	7 3
Sold the calf for	-	1	10 0
Value of manure, four large waggon loads	-	3	0 0
Value of butter	-	32	9 6
		<hr/>	52 6 9
Total expense		21	10 8
		<hr/>	
Profit	<i>l.</i>	30	16 1

Expense.

The same as in my last years return	-	21	6 2
An additional expense for farriery	-	0	4 6
		<hr/>	
	<i>l.</i>	21	10 8

Having been taken ill with the yellows, at the time of her calving, she required the assistance of a farrier for three weeks. The complaint fell into the udder, and was, no doubt, the cause of her not giving so great a quantity of milk as she did the season before.

This complaint was very general among milch cows that spring, in this neighbourhood; many cows totally lost their milk, and some died of the disease.

I have stated this, because many persons have asserted, that I ruined my cow's constitution by milking her too long; and that she would never be the same again. The produce of milk was not so great as last season; but I have no doubt that was in consequence of the complaint, and from no other cause whatever. The produce of butter this season proves the milk to have been equally as rich as it was the former season; the quantity of butter being in proportion to the quantity of milk.

It will be observed, that the first fortnight she gave no more milk than what the calf sucked; and that she was not milked so long, by three weeks and one day, as she was the former season.

The third years account of the produce of milk and butter, from a cow the property of William Cramp, of Lewes, in the county of Sussex, for the season, commencing the 6th of April, 1807, that being the day she calved, up to the 4th of April, 1808, a space of time of fifty-one weeks and four days.

BUTTER.	No. of Weeks.	Pounds per Week.	Quantity of Butter.	Sold at per Pound.	Total Value.
				s. d.	l. s. d.
From the 6th April to 20th April	2	6	12	1 6	0 18 0
From the 21st April to 1st June	6	18	108	1 6	8 2 0
From the 2d June to 5th Oct.	18	16	288	1 6	21 12 0
From the 6th Oct. to 30th Nov.	8	13	104	1 6	7 16 0
From the 1st Dec. to 8th Feb. 1808	10	11	110	1 6	8 5 0
From the 9th Feb. to 14th March	5	8	40	1 6	3 0 0
From the 15th March to 4th April, left off milking	2 1 2	5	13	1 6	0 19 6
	51 1 2		675		50 2 6
Deduct for 280 pounds of butter, sold } at 1s. 4d. per pound only }					1 3 4
					49 9 2

Milk.

From 6th April to 20th April, 8 quarts per day	-	112
From 21st April to 1st June 22 do. do.	-	924
From 2d June to 5th Oct. 20 do. do.	-	2520
From 6th Oct. to 30th Nov. 15 do. do.	-	840
From 1st Dec. to 8th Feb. 13 do. do.	-	910
From 9th Feb. to 14th March 10 do. do.	-	350
From 15th March to 4th April 7 do. do.	-	126
		5782

The milk being measured, when milked from the cow, there must be deducted for cream	-	675
		5107

Produce from butter	-	l. 49 9 2
5107 quarts skim milk, at 1d. per quart	-	21 5 7
Value of dung made this season	-	3 0 0
Sold the calf at 14 days old, for	-	2 12 6
		l. 76 7 3
Total expense		24 14 2
Profit		l. 51 13 1

Expense.

Expense as in my last year's return	-	l. 21 6 2
An additional expense in consequence of the rise in price of grains and pollard	-	1 10 6
Ditto for ten sacks of malt dust, at 2s. 6d. per sack		1 5 0
To the farrier for five drinks at the time of calving		0 12 6
		l. 24 14 2

On trial, I found malt dust to be serviceable to the cow, giving her about a double handful at a time, mixed with the grains and pollard: I would not recommend a greater quantity. It may be complained by some, that they cannot get grains to feed their milch cows with: that difficulty may be removed by potatoes as a substitute, grinding them in a common apple mill, or pounding them in a trough. Then mix the pollard with them as recommended in my first report: potatoes are a very fine food for milch cows.

The cow calved the 23d of April; has a very fine calf, is in good condition, and going on as well as usual.

The fourth year's account of milk and butter, from a cow, the property of William Cramp, for the last season, commencing the 23d April, 1808, that being the day she calved, up to the 13th of February, 1809, a space of forty-two weeks and three days.

BUTTER.	No. of Weeks.	Pounds per Week.	Quantity of Butter.	Sold at per Pound.	Total Value.
				<i>s. d.</i>	<i>l. s. d.</i>
From 23d April to 9th May	21-2	2	5	1 6	0 7 6
From 10th May to 6th June	4	15	60	1 6	4 10 0
From 7th June to 5th Sept.	13	14	182	1 6	13 13 0
From 6th Sept. to 7th Nov.	9	12	103	1 6	8 2 0
From 8th Nov. to 2d Jan. 1809	8	10	80	1 6	6 0 0
From 3d Jan. to 16th Jan.	2	7	14	1 6	1 1 0
From 17th Jan. to 23d Jan.	1	6	6	1 6	0 9 0
From 24th Jan. to 30th Jan.	1	5	5	1 6	0 7 6
From 31st Jan. to 6th Feb.	1	4	4	1 6	0 6 0
From 7th to 13th Feb. left off milking	8	2	2	1 6	0 3 0
	42 1-2		466		34 19 0
Deduct for 80 pounds butter, sold at 1s. 4d. per pound only					0 14 0
					34 5 0

Milk.

From 23d April to 9th May,	3 quarts per day	-	51
From 10th May to 6th June	20 do. do.	-	560
From 7th June to 5th Sept.	18 do. do.	-	1638
From 6th Sept. to 7th Nov.	16 do. do.	-	1008
From 8th Nov. to 2d Jan. 1809	12 do. do.	-	672
From 3d Jan. to 16th Jan.	9 do. do.	-	126
From 17th Jan. to 23d Jan.	8 do. do.	-	56
From 24th Jan. to 30th Jan.	7 do. do.	-	49
From 31st Jan. to 6th Feb.	6 do. do.	-	42
From 7th Feb. to 13th Feb. left off milking,	2 1-2 do. do.	-	17
			4219

ACCOUNT OF AN ENGLISH COW.

339

Brought forward - - - 4219

The milk being measured when milked, there must
be deducted for cream - - - 466

3753

Produce from butter - - - l. 34 5 0

3753 quarts of skim milk at 1d. per quart 15 12 9

Value of dung made this season - 3 0 0

Sold the calf at 17 days old for - - - 1 16 0

l. 54 13 9

Expense as before 24 14 9

Profit l. 29 19 7

N. B. There has been a doubt in the minds of some people, that I have overrated my skim milk at one penny per quart. According to the price of food in this part of the country, where I reside, I am still of the same opinion, that skim milk, at one penny per quart, is cheaper than any other food I can buy to feed my pigs; ground corn not being sold for some years past at less than 4s. 6d. or 5s. per bushel, weighing about 36 pounds. When I oppose 60 quarts of milk to a bushel of such food, I am fully convinced it would do more good than the bushel of corn.

No doubt in that part of the country, where corn may be bought for 2s. or 2s. 6d. per bushel, skim milk would there be of less value; but I have stated my price suitable to that part of the country where I am resident.

Gentlemen who live in Ireland, Scotland, Wales, and in the cheaper parts of England, will, no doubt, think skim milk very dear, at one penny per quart. I have seen it sold four quarts for a penny in Ireland.

The cow calved the 3d of April, has two very fine calves, is in good condition, and promising to do equal to any former season. She has been in my possession five years, and was ten years old last March.

The fifth year's account of milk and butter, from a cow, the property of William Cramp, for the last season, commencing April 3d, 1809, that being the day she calved, up to May 8th, 1810, a space of 57 weeks.

BUTTER.	Number of Weeks.	Pounds per Week.	Quan- tity of Butter.	Total Value. l. s. d.
Twin calves at nine weeks old, at 6 guineas	9			12 12 0
From 6th June to 3d July	4	17	68	5 2 0
From 4th July to 18th September	11	16	176	13 4 0
From 19th September to 13th November	8	14	112	3 8 0
From 14th November to 25th December	6	12	72	5 8 0
From 26th December to 26th February, 1810	9	10	90	6 15 0
From 27th February to 23d April	8	8	64	4 16 0
From 24th April to 30th April	1	7	7	0 10 6
From 31st May to 7th May left off milking	1	5	5	0 7 6
<i>Note.</i> Sold all the butter at 1s6 per pound.	57		594	57 3 0

Milk.

	Quarts per day	Quarts.
From 6th June to 3d July	24	672
To 18th September	22	1694
To 13th November	18	1008
To 25th December	14	588
To 26th February, 1810	12	756
To 23d April	10	560
To 30th April	8	56
To 7th May	5	35
		5369

The milk being measured when milked from the cow, there must be deducted for cream	594
	4775

Four thousand seven hundred and seventy-five quarts

skim milk, at 1*d* per quart - - - - - *l.* 19 17 11

Value of new milk, exclusive of what the calves sucked from
3d of April to 9th of April, ten quarts per day,

seventy quarts, at 5 <i>d</i> per quart	-	-	-	<i>l.</i> 0 17 6
To 23d April, 8 quarts per day, 112 quarts	-	-	-	1 8 0
To 7th May 6 do. do. 84 do.	-	-	-	1 1 0
To 21st May 4 do. do. 56 do.	-	-	-	0 14 0
To 4th June 3 do. do. 42 do.	-	-	-	0 10 6
				4 11 0

Amount brought forward	-	-	-	-	4	11	0
Value of dung made this season	-	-	-	-	3	0	0
							<hr/>
					84	11	11
Expense deducted as before	-	-	-	-	24	14	2
							<hr/>
Profit	-	-	-	-	£	59	17 9

In my statement this season, I have given no account of milk farther than to 7th of May, although she was milked up to the day before she calved, she would not go dry; but the milk being brackish was fit for no use but the hogs. I do not perceive the least injury she has sustained by it; her milk came with the calves, and as soon and as plentiful as if she had been dry for two months, and her calves in good and lusty condition. She is now in as great perfection for the dairy as in any former season. It will be observed, that the cow produced a greater quantity of milk this season, but not a greater quantity of butter. This I cannot account for. It may be the having twins; nature ordered it so, that they might be sufficiently supplied.

It will be also observed, she produced a great quantity of milk besides what the calves sucked, and why not make butter? The trial was made, but in vain. The cream produced was small in quantity, and poor; and every trial to make it into butter, for many hours, was to no purpose. This strange circumstance I am quite at a loss to account for, as I always milked her myself, sometimes before the calves, and at other times after; but the milk I got, produced no cream sufficient in quality to make butter. *Query*, could the cow have a power of withholding the cream part of her milk from me, or could the calves have an art of sucking it.

In managing milch cows, after the manner I have described, difficulties may arise in the opinion of many people, but I think there are few difficulties, but what might be remedied. If grains cannot be had, there is no land but will produce potatoes: and they are an excellent substitute for grains, pounded in a trough, or ground in a common apple-mill, and then mixed with bran. Bran, also, would be a good substitute for grains, wetting it to the same state as grains, and then mix a little ground oats, or

malt dust to separate it. Milch cows may be fed with turnips and cabbages, provided proper attention be paid in doing it. One meal a day of turnips or cabbages will not affect the milk, provided care be taken, and not give them any rotten or withered leaves. One rotten turnip or cabbage would do more injury to milk or butter, than a cart load of sweet sound food. I have often given my cow cabbage, without any ill effects whatever. I have sown rye and tares, which I find to answer; they will come rather sooner than lucern, if sown the first week in September. One gallon of rye is sufficient to mix with a bushel of tares. If the rye be sown too thick, it will overpower the tares, and injure them; but sown moderately thin, it will support the tares, and keep them from the ground. I have sown oats and red clover, and cut the oats before they came out in ear: the oats will shoot up again (if cut before they are in full ear) and the clover grow up with them, and produce a good second crop; the clover will be in full perfection the spring following. After the crop of rye and tares come off, lucern may be sown; and it will be fit to cut once the same summer, but not later than the middle of October. The lucern will be in full cultivation next summer, and will produce four cuttings the season. Lucern should be cut before it grows hard and sticky, or it admits waste, and loses much of its goodness.

Dairies of any size could be managed after the manner which I have laid down, in most of its rules; a dairy of ten cows would require a plat of ground of about a quarter of an acre to range in; twenty cows, half or three quarters of an acre, and so in proportion to the number. No land, but will grow artificial grasses and vegetables; and, no doubt, it would answer even to cut the natural grass and feed them. The object is the great saving; for less than half the land would maintain them. The cattle produce (in general) nearly double the quantity of milk and butter, and a great quantity of manure made. Where cattle are kept in this manner, the dung should be gathered up every day, and thrown into a heap. The land to be cut should be that which lies nearest to the yard where the cattle are confined, in order to save carriage. Where milch cows are allowed to range abroad for their food, they will never produce that quantity of milk, that they will when confined, let their food be ever so plenty; when

they are not hungry, they will be searching after the sweetest spots of herbage, and thereby deprive themselves of rest. Cattle, when hand fed, will seldom refuse any sort of food, if properly attended; and no part of this country need be at a loss for provisions to feed them. Where grains and pollard cannot be had, milch cows should have a little nice hay (not heated) once a day, to keep them in a proper state, otherwise all green food would make them too loose. Often changing food is good for milch cows. I seldom give my cow two sorts of food following. I cannot be at a loss where there is so great a variety to be had, viz. rye and tares, lucern, cinquefoil, trefoil, cow-grass, clovers, natural grass, green oats, carrots, cabbage, turnips, grains, bran, pollard, hay, &c. &c. Thirty acres of land would be sufficient to produce food enough for forty dairy cows (if properly managed) including for hay; whereas, in the common mode of feeding, twice that number of acres would not do, and they would not produce above half the quantity of milk and butter. I think salting hay, when made into a stack for milch cows, would answer a good purpose. If salt could be had reasonably, about twenty pounds to a ton of hay, shaken regularly over every layer, by the makers of the reek or stack, would cause thirst, and thereby increase milk. The quantity of food milch cows will consume, it is not easy to ascertain; they should have sufficient, but not to commit waste. Cattle should not be over fed, so as to be surfeited; little at a time, and they will eat their food clean. I feed my cow six or seven times a day.

LETTER FROM N. HAMMOND, ESQ. TO HON. J. QUINCY.

Easton, (Maryland,) April 11, 1817.

SIR,

YOUR very polite and obliging letter of the 5th of March was received during a state of indisposition, from which I have lately recovered. In a different situation, the attention which it merits would have been promptly given, and the honour it confers immediately acknowledged.

The publication of my experiments on the culture of Summer Wheat, was intended for no other use than that which is declared. It was thought respectful to account to you for the result of

those endeavours which you had enabled me to employ; and if the engagements, which pressed me about the time the narrative was prepared, had not prevented, I should have forwarded it to you in a different form. But as you have been pleased to accept it as it is, and the trustees have expressed a desire to insert it in their next number, I cannot but submit to this flattering compliment, and yield to their discretion.

I very sincerely thank you, Sir, for the specimen of Spring Rye which your letter enclosed. The size, brightness, and beauty of the kernels exceedingly surpass every thing of that kind I ever saw before. They have been carefully planted in the garden and shall be attentively cultivated. I anticipate great advantages from the culture of it.

The pamphlet you forwarded also arrived safely, and has been read with satisfaction. The cultivation of plants in drills, and the substitution of other spring crops in the place of Indian corn, are propositions which deserve to be very seriously considered.

It has long been my wish to cultivate my grain crops in drills: but the plans which have been seen of the instruments for this purpose appear to be so complicated and expensive, that, considering the smallness of my farm, it has not been deemed advisable to procure one. Observing, however, that the trustees of your society possess information upon the subject of these machines, which they offer to afford, I am induced to request such a description of the simplest kind as may enable a workman here to make one; if a description with this view may be properly granted.

It is observed that you have used this husbandry with remarkable success in the culture of carrots. There is not indeed a more valuable root; and in general there is none whose growth is more certain even in unfavourable seasons. I have cultivated turnips in the same manner with much advantage; but, if you will permit me to suggest it, there is reason to believe that manures *in the drill* will have a sufficient effect upon the growing crop, without spreading it over the ground; and if this should be true, a great deal of manure may be saved. When the ground is prepared, the drill may be made with the plough drawn forward and backward six, eight, or ten inches deep. This operation will open the trench sufficiently; and the manure may be put in

the trench and covered up with the hoe: in due time the seed may be sown upon the drill. It is perhaps advisable to lay the drills three feet apart for the great convenience of dressing the plants with the horse-hoe; and in the cultivation of summer plants this mode of working them probably forms a sufficient ridge without the trouble and delay of forming them originally.

I have the honour, &c.

N. HAMMOND.

EXPERIMENTS UPON SUMMER WHEAT, SUBMITTED TO
THE FARMERS OF TALBOT COUNTY, MARYLAND.

THE author of this address, in the summer of the year 1815, read in the publick papers some letters and observations upon this article, which were published by the trustees of the Massachusetts Society for promoting Agriculture. The account given of the useful culture of it in the neighbourhood of Boston engaged his attention; and he became desirous of making a trial of it here. It had long been believed that the inclement and changeable weather during our winters and springs had materially injured the common crops of wheat; and it was thought that if the summer wheat could be successfully cultivated among us, it might be used to repair the losses so frequently sustained from them, and therefore allow the farmer with great convenience and advantage to reserve a portion of his fallow field for this object in the spring.* In this case he might sow a smaller parcel of the common wheat in the fall, and at an earlier period; and be sooner prepared to attend to the gathering and securing of his corn: and the ground intended for the summer wheat, by remaining exposed to the action of the frosts and thaws during the winter, might be improved, and better managed for the reception of a crop in the spring.

With these reflections, the author concluded to procure a small quantity for the purpose of making an experiment. Notwith-

* The usual grounds, in which the farmers of this county sow their wheat, are the fields cultivated in Indian corn during the preceding summer; though some prepare a field in *fallow*: but those, who do this, also sow their corn-fields in wheat: so that, for the purposes of fall wheat, their grounds may equally be called "fallow fields."

standing his early efforts to obtain it, the arrival of it was very much delayed : he, however, received a barrel of it on the 2d of March last, with some directions for its culture. It was said that it might be sown during any time in April; but an opinion was expressed in the directions that the sooner it could be sown in the spring, the better. He resolved to sow a part of it as soon as he could in March, and the residue as soon as he could in April. The appearance of the wheat was not agreeable. It was browner than the red wheat, considerably shrivelled, and much mixed with rye and barley; and it came so late that there was not time to separate these grains and clean the mass : it weighed fifty-seven pounds the bushel.

The lot selected for the first crop had been cultivated in Indian corn in the year 1814, in oats in the spring of 1815, and in turnips in the succeeding fall : it was consequently pretty clean, and moreover was lightly manured for this project, and in good order. It consisted of ridge and bottom ; the ridge light, but not sandy ; the bottom stiff but drainable : it was ploughed up on the 8th of March and once dragged over ; but the bottoms being rather too moist, the ground was left exposed to the sun and wind with a design to drag it over again before the seed was sown. In the mean time the wheat was well washed and skimmed, and in the evening was put into the drainings of the dung heap to steep. It became so cold and the earth so frozen, that nothing more could be done till the 11th ; when the lot was dragged again, the wheat sown, and harrowed in ; but before the work was completed there fell a moderate snow which further embarrassed our labours. The lot contains about an acre and twenty perches of land, and one bushel and three pecks of wheat were sown upon it. It was intended that the roller should be carried over the ground immediately ; but such was the wetness or frozen state of the ground, that this operation was not performed till some weeks afterwards, when the wheat had obtained some growth, and was probably much improved by it. It first appeared on the 28th of March ; and in a very tender state sustained some severe frosts : the shoots became even yellow ; but it is believed they received no injury. From the time it was sown till the 11th of April, the ground received many rains and frosts ; but from that period till the night of the 14th June,

such a series of dry and cold weather succeeded as will be long remembered. The wheat, however, progressed; and on the 15th July it was cut with a scythe and cradle. The rye overtopped the wheat, and had been all cut out: the barley, being low, could not be so easily severed. As the wheat headed, several ears were affected by the smut in the usual way: but many ears were infested by it in a more advanced state, and when the grains were formed; and assumed a very unpleasant appearance; but as these grains dried, they crumbled into powder; so that upon treading and fanning the wheat, all the grains appeared plump and sound. The produce of this lot was twenty-four bushels; which, recollecting the nature of the season, may be considered a very good crop. The dryness of the weather prevented much perceptible difference in the wheat upon the ridge and in the bottom; though, generally, the crops here have succeeded best in the lighter grounds.

The piece of ground selected for the second crop had been cultivated in Indian corn the preceding year, and had lain exposed to the action of the winter: besides the corn-hills, a part of it had been well manured. It was in general a plain, and rather low stiff ground, but capable of being drained. It was ploughed up on the 1st and 2d of April and dragged over: it was dragged again on the 3d, and the wheat sown: it was then harrowed in and the roller carried over it. The ground was in good condition, and all the operations were well performed. The land measured off contained seven eighths of an acre and six perches, and nine gallons of wheat were sown upon it. It was washed and steeped as the other had been, with the addition of soot. A heavy rain fell upon it on the 11th, which was all it had that could be very serviceable till the middle of June: it began to appear on the 14th; but throughout its growth this crop never looked well. The Hessian fly was sometimes suspected, and many searches were made for it; but it was not ascertained that the wheat was affected by it. Some have supposed that the first crop succeeded better, not merely because it was planted sooner, but because, having had many rains, it was better *rooted* before the dry weather began. This crop was gathered on the 29th July, and produced only eight bushels, and inferiour in appearance to the other.

The summer wheat is low, well headed, and bearded: it does not shatter in cutting: the grains are dark; and though they continued plump for some time after being threshed and cleaned, they are now much shrivelled; but appear superiour to the seed which produced them. The straw is soft and tender: as the quantity was not worth the trouble of a rick, it was immediately carried into the loft and delivered to the horses. Though they had been using good hay, they fed upon the straw with apparent satisfaction; and it was continued to them till it was consumed. The bread made of it is not white; but it is sweet and excellent. It weighs sixty pounds the bushel. Whether, being now a native among us, it will answer better on another trial, will probably be decided the ensuing season. It is the belief of many experienced farmers, that *smut* may be prevented by the use of *pickle*; and under this impression the next experiment shall be made with that precaution. It may also be observed, that the ploughing of the ground in the spring for this crop may have the same effect upon the wild garlick, which is experienced from the culture of oats; and it is certain that no garlick appeared in the crops of which this account is given, though the lots are subject to it.

In this detail there is nothing exaggerated: it is published for the sake of calling your attention to a new article of husbandry, and of contributing something to your amusement: and with this motive it is hoped the length of the narrative will be excused.

St. Aubin, February 10, 1817.

ON THE HOOF AIL.

[Communication from Hallowell, District of Maine.]

WHAT is the exciting cause of this malady, does not appear to be known. The immediate occasion of it is a stoppage of the issues between the claws or hoofs, which exist in all ruminating animals; and which are very much like the issues so generally known in the back part of the fore legs of pigs; the stoppage of which produces disease, and eventually death, unless remedied.

The hoof ail indiscriminately attacks thin and fat cattle, and very considerable impressions are entertained that it is contagious; therefore, until the contrary is proved, it is safer so to consider it. From a very careful comparison of cases (from memory only) it appears to affect cattle who are in a feverish state, from various exciting causes; as over work; sudden changes from hard work to rest and higher feeding (a practice very common with farmers after working their cattle hard all winter, as a preparation for their spring's work;) being out in a storm; or being driven much, and kept long in the mud. In cows and young cattle, it seems to take either those that are brought from worse keeping, to better; or the finest and best cattle in the yard. But all these observations may be erroneous; for the disease often appears suddenly, without any apparent cause; affecting individuals of the same stock tied in different parts of the barn, and in entirely different cases as to condition, exposure, &c. &c. It, however, very frequently goes through a whole stock, though it does not appear to follow in regular succession according to proximity in the stable, or in the yoke. This may arise, either from contagion or the same exciting causes, operating on the whole. In short, it is a disease very terrible in its effects at times, and which does not appear to be understood. As very few cases of perfect recovery take place in a violent attack, and, as in all cases, the recovery is very tedious, we should rather *prevent* than *cure*; for which end, we must carefully watch for the symptoms, and without any delay apply the remedies.

Symptoms. When an animal is at all lame, its foot should be very carefully felt. The first indication is usually an uncommon degree of warmth, and a soft and puffed feel of the parts immediately connected with the slit between the hoof, either before or behind the foot, and, generally, just above it. If in the hind foot, and not easily handled, a fulness may generally be perceived, by standing behind the animal and carefully comparing the appearance of the two feet, between the dew claws and the hoofs (for it very rarely commences its attack in more than *one* foot.) In the fore foot, it generally swells forward; and on taking up the foot, the slit between the hoofs will have an appearance of dryness, easily distinguishable to a person used to cattle; and

the animal frequently licks the front part of the foot. Instances often occur of sudden and extreme lameness, without any appearance of heat or swelling in the foot; and these are often the worst cases; but one symptom rarely fails to accompany the disease, which is, extreme restlessness and appearance of anguish, attended with loss of appetite and flesh; but without, in the least, affecting the brightness of the eye, and, perhaps, sometimes unnaturally increasing it; but the eye has a peculiar cast. As a general rule, it is safest to attribute all lameness of the foot, which cannot be traced to a sufficient cause, to the hoof ail. Lameness of the foot can generally be distinguished from that of the leg, hip, or shoulder, by making the animal step over a stick or rail, and carefully watching its motions.

Remedies. The foot should be carefully washed and cleaned, and thoroughly examined, to be sure that the lameness does not arise from a nail casually run into the foot, or a prick in shoeing, or from a wound from a stump or other substance between the hoofs (a case frequently occurring.) If no appearance occurs of any break in the skin, while the foot is still wet, apply, as nearly as may be, to the centre of the slit, between the hoofs, from one to three grains of corrosive sublimate (reduced to a fine powder) the dose to be proportioned to the size of the animal and the violence of the attack. Care must be used, that the powder is put completely into this slit, for it is a very strong poison, and the animal, as soon as at liberty, will begin to lick the foot, if a fore one. The moisture left by the washing, makes the powder adhere; and the effect is produced in a very short time. Some prefer mixing the powder with hog's lard, which answers; but it is thought less powerful: it has one advantage, however, as being less dangerous to keep in a house (for no one takes salve inwardly.) Where corrosive sublimate cannot be obtained, any other violent stimulant may be applied. Common salt is often effectual in very slight attacks; but it is of the greatest importance to lose no time. The application is to be repeated once every twenty-four hours, till a cure is effected, or till the foot shews unequivocal signs of a gathering which will break. It is supposed, that the corrosive sublimate, by stimulating the parts, removes the obstruction, and enables nature to resume the natural discharge from the issue, of a matter, which

(as soon as pent up in the foot) causes inflammation and suppuration, and, at last, forms an abscess, at all times very difficult to heal, and which, when large, *takes off one or both hoofs, which are never perfectly replaced.* It must, therefore, be considered as an object of the first importance to restore the secretion and discharge, without allowing a suppuration. This done, the cure is effected, and, since this course has been followed, no bad case has occurred in a very considerable stock of cattle, and the men attending them are quite familiar with the cure. If, from want of attention, or the violence of the attack, the gathering is formed and breaks, it must be treated like any other tedious ulcer, and without any violent or harsh measures. The animal should be kept quiet, fed well, and occasionally purged. As soon as the discharge has ceased, a salve of flowers of zinc and hog's lard appears to be the best dressing.

It cannot be too strongly impressed on the minds of those who have the care of cattle, that not a moment is to be lost; and that the corrosive sublimate produces no other inconvenience than pain for a few minutes, even if it should be applied in a case of lameness, which afterwards proves to have arisen from other causes.

An account appeared last season, of the cure being effected by cutting off the point of the hoof with a chissel, till it bled considerably. Of the efficacy of this remedy, no opinion is given, as it has never been tried here; but the impression is not favourable, as it must occasion temporary lameness, and, in unskilful hands, prove something more than temporary.

All such barbarous modes of treatment, as hair ropes drawn backwards and forwards between the hoofs; hot irons; cutting out the part affected, and pouring into the wound so made, hot pitch and other ingredients; scraping out the wound, and applying spirits of turpentine: in short, all remedies of torture, should be at once discarded, and a simple mode of ascertaining the cause, and then removing the evil in the most expeditious and humane manner, be substituted.

No inconvenience is known to occur, from keeping an ox at work, if the lameness is not so great as to impair his condition; and it generally yields to the three or four applications in the foot where it began; but frequently it must be followed round all the feet in succession.

The disease seldom attacks cattle that are *not* worked, till after they have been at grass ten days ; and is more frequent towards spring, than at any other time. An ox that has had it badly once, is subject to returns ; and the butcher is then the best doctor.

STRAW CUTTER.

Pittsfield, Jan. 29, 1817.

DOCTOR AARON DEXTER,

DEAR SIR,

WHEN I last had the pleasure of seeing you I intended to have asked you to favour me with two or three numbers of the *Agricultural Repository*, which contain a description of Hotchkiss's Straw Cutter. In No. 4, of Vol. III. you merely allude to this valuable invention. In the next number you state at large your opinion of it, and the premium awarded him. This useful machine is getting into general use. It has employed a large number of mechanicks in erecting them. They are becoming common here, and are erecting all over the state of New York, by enterprising young men. Several valuable improvements have been made. And to day I have examined two new inventions, on the same principle, but differing in form, and cost about half the sum. I think these promise to be more useful, than Hotchkiss's, being more simple and less expensive, and cut faster. I discovered soon some small defects, and suggested them to the inventors. When they are made perfect for work, I will forward you a description of them. They contain double the knives, and must cut rapidly. In one, the knives are secured to a wheel, placed horizontally, and the knives at an oblique angle of about 45 degrees. In the other, the knives are fastened to a wheel like Hotchkiss's balance wheel, only larger and firmer, and turn in a circle, and the knives are inclined to a circle, which makes them work easy and fast. This is, indeed, the age of invention.—There is no limit to the efforts of genius. We have seen with no ordinary satisfaction, your notice for another anniversary meeting at Brighton, and your premiums. They are liberal, and well selected. I hope to have the honour of witnessing your display, if I can get through

in season with our meeting here, which precedes yours a few days. Next month we shall publish our notice and premiums. So limited are our funds, that we can offer no pecuniary excitements equal to yours. We must effect our purposes with less means, and stronger appeals to ambition and the love of distinction. Great exertions are making in the state of New York and elsewhere, to arouse our countrymen to a sense of their present condition, and the necessity of eliciting their own native resources, and making their fruits the chief dependence for removing the pressure of the times, and the only safe substitutes for the loss of foreign commerce and navigation. The policy now attempted, is to increase the means of a most extensive and active coasting and inland traffick. This looks well, and I think merits a great and united effort. It must succeed—it is our only safe reliance. The Berkshire Society have been called on to take a lead in this enterprise.

I am Sir, with cordial esteem and respect,

Your humble Servant,

THOMAS GOLD.

ON THE USE OF SEA SAND MIXED WITH OTHER EARTHS.
—POTATOES PLANTED LATE, AND WHICH HAVE NOT
HAD TIME TO RIPEN, BEST FOR SEED.

Saco, May 23, 1817.

HON. JOSIAH QUINCY,

SIR,

HAVING of late paid some little attention to agriculture, and having to cultivate some low flat land, infested with what is called the wire worm, a small red worm, about an inch long, the bigness of a large needle, which I observe is complained of in many parts of the commonwealth, I am persuaded, from experience, that sea sand, put under corn or potatoes with manure, or spread on the land, will go far, if not wholly to the total destruction of those destructive worms, on which nothing else seems to have any effect. It has a beneficial effect spread on land before ploughing, or even after land is planted with corn or potatoes;

not only to destroy the wire worm and other insects, but to increase the crop. With my neighbours a load of sea sand is considered preferable to a load of their best manure, to mix in with their common barn manure, or to spread on their gardens and low flat land.

One thing more I will mention for your consideration, which is, that late planted potatoes, which are gathered in before ripe are far the best for seed the next year. If kept in a dry warm place in a cellar, they will be much earlier, and likely to produce more abundantly the next year, and will be as good for use the following spring, though they may not be so good in the fall. The last season, I planted a patch of low flat ground with potatoes the seventh day of July, which came up and grew very well, until about the last of September, and endured several severe frosts without injury, until the three very cold nights, the last of September. The first of which they felt but little; the second, they felt more severely; but the third they were cut down. The potatoes were dug the last of October, and produced the largest and most from the hill, of any I raised the last season by far. I have planted some of the same this spring, and find they came up some days sooner than others of a more early kind. Late planted potatoes will endure frost better in the fall, than those planted more early. The above potatoes were put into an arch, under a fireplace, where fire was kept during the winter. They began to sprout by February, and though much sprouted by the first of May, taking off the sprout-end to plant, the remainder was, notwithstanding, perfectly sound and good for use.

If the above information should be deemed by you worthy of consideration or publication, the whole, or any part, I shall feel myself highly compensated for my labour.

While I remain, with due respect,

Your humble Servant,

WM. MOODY.

RESULT OF SOME EXPERIMENTS IN BURNING CLAY FOR MANURE, IN A LETTER TO THE BATH SOCIETY IN ENGLAND, BY THE REV. W. WILKINSON.

[The following narrative of an experiment in burning clay for manure affords a valuable addition to our stock of agricultural knowledge. Wherever clay and fuel abound, a good manure may be had in abundance at a cheap rate. Mr. Wilkinson's letter will be read with the more interest, and his example followed with the greater confidence, as he has manifested a wish not to raise unreasonable expectations, and recommends his practice rather as a means of supplying a deficiency of other manures, than as a substitute for them where they can be had in sufficient quantity at a moderate price. He states, however, that in two instances where he made trial of the burnt clay on one portion of a field, and barn manure on another, the crop from the former was quite equal to that from the latter. We are led to infer from his statement, that where fuel is cheap, or of no value for the market, the profit from the use of burnt clay will be greater than from any other species of manure.]

[Bath Papers, vol. 14th.]

GENTLEMEN,

I HAVE been led to believe that the result of some experiments, I have had in my power to make, in the burning of clay, and in the use of clay ashes as manure, may be acceptable to the Society.

In the year 1815, a tenant threw up a farm belonging to me at Woodbury, in Cambridgeshire; and I was induced by many circumstances to take it into my own occupation. The farm is of very considerable extent, and chiefly under the plough; the soil a cold, stiff, tenacious, clay; it had been over-cropped for a long series of years, without a proportionate return of manure; and it is so situated, that no quantity of manure is to be purchased in the neighbourhood. It became my object then to raise as much manure as possible on the premises; and having by accident seen Mr. Craig's letter on the burning of clay, I conceived mine to be a soil well suited to the practice. I accordingly, after some correspondence with that gentleman, made my first experiment in September, 1815. Having marked out a space of fif-

teen feet by twelve, I excavated it one foot deep, and with the soil thrown out made a wall around the space. At each corner I made an air pipe, (each pipe made of sods) extending only two feet into the enclosure in a diagonal direction. In the centre of the enclosure I placed upright the but end of a large tree, around which other fuel was placed, covering the bottom of the whole space within the wall. The fuel consisted of straw, bushes, large billets of wood, and dry roots of trees. I then put dry turf over the whole surface, which again was covered with a thin coat of clay, newly dug up, except a small hole by which the fire was introduced. The fuel being dry, the fire spread rapidly, and it required the active exertions of two men to smother the flames as they burst out. They used for this purpose dry turf, which they immediately covered with clay. During the first two or three days the surface of the heat occasionally sunk in places, and apparently grew cold; into these places fresh fuel was put, care being taken to make but small openings; and I may here remark, that this operation should be done as speedily as possible; for external air let into the heap after it was once fairly on fire, seemed to do mischief.

It now burned well and evenly over the whole surface, for several days; each covering of clay crumbling to ashes in an hour or two after it was put on. This heap was on fire twelve days, and was constantly attended in its progress by two men, from four o'clock in the morning till nine at night; when a thicker coat of clay than usual was put on: one of these men was chiefly employed in digging the clay, the other in wheeling it (only a few yards) to the heap and throwing it on, sometimes by hand, and sometimes with a spade. This heap I afterwards found contained thirty-seven cart loads of ashes; and as my farm lies nearly level, and the distance of transportation small, the carts were well filled.

In the spring of this year, 1816, I burned another heap, which was found to contain forty loads of ashes; and during the summer I burned two more heaps, the one contained seventy-two loads of ashes, the other about fifty-five loads.

I never had more than two men and a boy employed at once; and my bailiff having kept an exact account of the expense attending these experiments, I am enabled to state that, on the

average, the cost was about 1s.6d. the cart load. In this calculation nothing is charged for the fuel, having plenty of bushes and offal wood on the premises; a value, however, was put upon it as it was used, and 3d. or 4d. a load may be added on this account; I may, therefore, say that the whole cost was 1s. 9d. the cart load.

I will now add a few general remarks, which may be useful to any one who may wish to burn subsoil. The fire appears to spread upwards most readily, and the heap grows first cold at the bottom, and towards the walls; for I seldom remarked that the fire penetrated through the walls. As my experiments were made in different parts of the farm, there was a slight variation in the soil; and I observed that, where the clay had no mixture of gravel or stones in it, it burned the best; and I always thought it crumbled quicker when it was put on newly dug up. Summer is certainly the best season for this operation, chiefly on account of the short nights, which permit the heaps to be watched with more ease. Moderate rain does but little harm to the fire; high winds are infinitely more destructive to it. I do not think the clay loses much in quantity by being exposed to the action of fire; but it certainly decreases in weight. Wood is supposed to be the best kind of fuel, coal requiring too much air to promote combustion.

It now remains for me to give what information I am able, in regard to the beneficial effects of clay ashes as a manure. The heap of ashes I burned in the autumn of 1815 was used early in this year to manure an acre and a half of land, part of a much larger field. A part of the same field had been folded late in the last year with sheep, and the remainder was manured with very good yard dung. The whole field was cropped with barley; and either from the seed being ploughed in too deep, or some other cause, the crop was not a very good one; but I may truly say, that the part manured with ashes was better than that dunged: the part folded was evidently the worst. The same gradation may now be observed in the clover; the seed of which was sown soon after the barley.

The greater part of the heap of ashes I burned this spring was used in the beginning of June to manure an acre and a quarter of land, in the middle of a field of five acres, the remainder of

which was manured with the best yard dung. The whole was sown towards the middle of that month with red-rind turnip seed; a Northumberland drill was employed to deposit the seed; the distance between the ridges being two feet and a half so as to admit the horse hoe. The crop is a very good one indeed, many of the turnips being twenty-six inches in circumference; and one which I had taken up and weighed, was twenty-nine inches in circumference, and weighed eleven and a half pounds. I do not perceive that the part manured with clay ashes has at all an inferior crop on it to the rest of the field; my bailiff, indeed, remarked, that on the plants first coming up, he thought those on the clay field the best.

From this heap of ashes six loads had been reserved, which were thrown, the end of June, over somewhat less than a quarter of an acre of rough grass land; and it is perceptible that the sheep during the summer, have eaten that part of the field more closely than the rest of it.

The two heaps of ashes I burned during the summer containing together one hundred and thirty loads, have been used the last October, to dress six acres of land, which had been got into a good tilth by a naked fallow; the ashes were first spread, the wheat seed was then sown, and they were lightly ploughed in together. The rest of the field, in which these six acres lie, had been folded with sheep on a naked fallow, and was sown with wheat about the same time. I left my farm about ten days ago, when the young wheat was just come up; and it appeared full as thick on that part of the field manured with the ashes as on the remainder of it.

I have thus, in the course of a year, burned upwards of two hundred loads of ashes, and manured nine acres of land, at an expense, fuel included, of about 18*l.*; and I am so well pleased with the result of these experiments, that it is my fixed intention to burn clay, to a much greater extent, during the next year.

Having brought my communication to a close, I may be permitted to say, that the practice of burning subsoil is not altogether novel; Lord Halifax and others practised it in the beginning of the last century; and successful experiments of the same nature have been made from time to time, until Mr. Craig, of late years, has introduced the practice into the southwestern parts of Scot-

land. It is now to be hoped that being better understood it will become more general. I take the liberty, however, of recommending to those gentlemen, who feel inclined to burn subsoil, to consider, first, the fitness of their soil for the purpose; and whether or not their situation affords a facility of procuring other well known manures; for, as this practice is not unattended with expense, it must always be a matter of calculation, whether other manures cannot be procured cheaper. I would lastly recommend to them, if they do make the trial, not to be content with a single desultory experiment, which from many causes may possibly fail. My own success, in the first instance, I attribute to having a plentiful supply of dry fuel on the spot; but chiefly to the repeated instructions of Mr. Craig.

ON ADAPTING PLANTS TO THE SOIL, AND NOT SOIL TO THE PLANTS.

BY MRS. AGNES IBBETSON.

[Whether a soil be good or not, depends on the character of the plants which are to be placed in it. Some of our most common esculent vegetables, as the carrot and turnip, flourish better in a sandy soil than in a rich garden mould. The soil which, in France, produces the most delicious grapes, and those from which the choicest wines are made, is far from being rich. The finest water melons have been discovered growing in the sandy deserts of the middle latitudes of Asia. That soil, it may be said, is richest which affords the greatest quantity of sustenance to vegetation; but it is to be considered, that those plants which grow best in dry, light soils, are so constituted as to derive a considerable part of their nourishment from the atmosphere, and, of course, do not require much moisture in the soil.

The object of the following communication, extracted from the Bath Society's Papers, is to draw the attention of farmers to the character of the soils which compose their farms, and to a more careful selection of plants best suited to them. The neglect of this leading feature in good husbandry, is stated to be a fault prevalent in England. Is it not quite as prevalent in this country? This is a question well deserving consideration, and it would be highly gratifying to us to learn from the different parts of our state, how far the

intelligence of our husbandmen has enabled them to anticipate the information contained in the subjoined article. One of the first and happiest consequences of attention to this subject, would be the introduction of a greater variety of field crops, by the addition of some, which, in Europe, have succeeded well, and are found profitable, from the care taken to give them their proper exposure and appropriate soil.

It still remains to be ascertained, whether some of the diseased appearances on plants, which are sometimes attributed to insects, and respecting which, our knowledge is conjectural, are not ascribable to the injurious effects of improper soil.]

[From the Bath and West of England Society's Papers.]

TO THE SECRETARY,

It has long been my intention to address a letter to that Society, who several years past honoured me with what I considered as the *most flattering* and highest proof of their approbation: but constantly occupied in dissecting and studying *the nature of plants*, I was perpetually prevented fulfilling my wishes; but within the last few years, having endeavoured to draw *results* from the *dissection* of vegetables *applicable* to *agriculture*, and having the use of a pretty large farm to assist theory by practice, I shall, with the greatest pleasure, dedicate my future services where gratitude should lead me to offer them, if any thing I can write can possibly be acceptable to so eminent and learned a Society.

I have been lately much employed in endeavouring to shew that all plants should be divided, disposed, or placed, according to the different soils, congenial to their habits, from which they originally proceed; and that it is to the total inattention to this circumstance, that we probably owe the very strange and contradictory results constantly to be found in all agricultural reports. No person can read with attention the late accounts delivered to the House of Commons, respecting the growth of corn throughout this kingdom, without being struck with the contradictory returns transmitted of the whole; and without being convinced, that there must be some hidden cause for such a strange diversity in the gains of the *farmer*: as there are many instances adduced, in those reports, of the same excellent

management, where the same seed has been sown, an equal degree of labour performed, with the same *season, time, and manure* employed, and one farmer has gained three times as much again as was expended for putting in the crop, while *another* has scarcely exonerated and repaid himself for the labour and seed: what then could be the cause of the loss of the latter, and gain of the former? It must, I am convinced, be attributed chiefly to the agreement or disagreement of the plant with the soil in which it is placed, its situation, and aspect; three things, of which the farmer knows but little, or ever takes into his calculations. He has but one way of putting in plants, *loading the earth with manure*. But to adapt the plant to the soil from which it originally came, to *suit* also the *manure to both*, that they may exactly agree, and not injure the vegetable; that the situation of the plant may be consulted, with respect to humidity and dryness; and that, to complete the whole, the *aspect* also may be fitted, so that the plant that *loves* the *sun* may be exposed to it, while that which prefers shade may receive it:—these are attentions truly wanting to our agricultural system, as I hope to shew.

It has been a subject of considerable inquiry among agriculturists, as in what consists the food of plants. Some have attributed it to water, some to earth, and others to air. To all these sources vegetation is indebted; the fertilising principle of all manures is referable to the extractive matter arising from decomposed animal and vegetable recrements, and in this state soluble in water, which is the carrying medium into the vegetable substances. Vegetables will not grow in pure earth, or pure water; some plants are so organized as to require only mechanical support from the soil, abstracting their nourishment from the atmosphere by means of their leaves; whilst others from their roots depend upon the soil for their support. Although many plants will grow in different soils, yet they have all their favourite ground; and it is more easy to accommodate the plant to the soil, than to adapt the soil to the plant. By knowing, therefore, what sort of plant the farmer is going to put in, he may of course be regulated with respect to the quantity and species of manure required, the aspect wanted, and the degree of humidity and dryness requisite for the plant. All plants came originally from

a peculiar earth; either from clay, sand, gravel, chalk, or loams formed from a mixture of some of these, or from a very wet or dry soil; and though many plants will grow indifferently in several species of earth, yet they have all their favourite ground, *that which they evidently prefer*. Now to make the soil fit for the plant, is certainly a very expensive thing; but to adapt the plant to the soil is not only an easy, expeditious mode, but one which requires infinitely less assistance in dressing, labour, seed, and care of every kind. It is true that all cultivated plants demand some manure, because nature gives not salt and oil *enough*, in *any earth*, to do without *some assistance* of this kind; but the plant that is natural to the soil requires infinitely less than that which is adverse to it, and may therefore be cultivated at a quarter of the expense. Now nature is so bountiful, that there is scarce a plant necessary to the food of man and animals, that, if we choose to seek it with care, has not *one peculiar sort* calculated for *every soil*. Thus in clovers, there is a sand clover, a clay clover, a gravel, and a chalk, clover; one that grows well in rich lands; and one that would be ruined in a good soil, and can grow and do well only in a poor one; one that will not endure moisture, and one that only grows in wet land; one that prefers hills, and one that will grow in valleys alone; one that likes the sun, and one that covets shade. Nature has been equally bountiful in most other plants peculiarly adapted to *agriculture*, and in which there are *quite as many species* fitted for *poor land*, as for *rich ones*; and, if planted in their own soils, give an infinitely *greater return*, and are not subject to those *dreadful disorders* but *too common* to plants placed in improper ground. I have repeatedly traced maladies arising from this source, that afterwards tainted the very means of life in a vegetable: and being constantly accustomed, when I heard of any extraordinary crop, to proceed to the place, and inquire thoroughly into the cause and management made use of by the farmer, I have generally found the success to proceed from accidentally putting the plant into that ground from which it originally issued, and manuring it according to the quantum of juices it received from the earth, and with that matter likely to form a proper compound adapted to its wants; in short, attending to the right rules of vegetable economy, and the common process of nature.

But I am sorry to say, that, in examining innumerable farms, *diversely situated*, I have but too often found this order reversed; the chalk plant put in sand, the sand plant in clay, and so on; and, what is still worse, the watery plant put in dry ground, and the dry vegetable in a wet soil; and in all these cases they cannot fail of making a very bad crop. A plant accustomed to a poor soil, placed in a good one, *rots*; while the one that prefers a *rich loam* is *starved* in a *poor one*. A clayey plant put in sand is blown out of the earth, for want of those *retentive powers* the root is used to; while the sand plant, placed in clay, decays at the root from the under moisture which it cannot bear. The chalk plant, also, placed in gravel, is destroyed by its own *acidity*, which is *no longer subdued*: for most plants (if the farmer do not grudge the making the soil) he may certainly do it, but it can never answer in point of expense. It is a strange mistake, and a most fatal one, that almost all, even *some of our best, gentlemen farmers* fall into, viz. that they cannot manure *too highly*. Now this is so completely the cause of innumerable failures, that I am most anxious to censure the practice. It always reminds me of the account given by Miller, of what was done in the *West-Indies*, when some botanists were desirous of bringing over some fine plants of the *cactæ species*. They inquired not what the plants *were*, but wholly inattentive to their being *rock plants*, they put them into tubs of the richest soil they could procure; the *plants all died*: but this was looked upon as accident, and the same process again followed, when one of the casks breaking, they concluded the plants must die, as the earth had left them; and flinging on them some dry sand, which happened to be in the way, ordered the cask down to the hold, when to their great astonishment the plants so treated *lived*, while those in the other cases died, as usual. This opened the eyes of the gardeners with respect to rock plants; but to this day sand plants, instead of having a poor soil, generally receive a rich one. There is not a more ruinous effect than that produced on the plant of a poor soil placed in rich ground. Some time since a gentleman brought me some turnip roots that had in the same manner failed for several years; and the potatoes had equally been vitiated the preceding year. It is, I find, a *common disorder*, in *gardens* especially, and all *rich ground*. When I dissected the plant, I

found the wood or sap vessels of the root were rotted off, and in their stead a number of large bladders of putrid water remained, as a sort of swelled and distorted root. But almost all nourishment from the earth was suspended, and the leaves alone retained a sort of life, from the nutriment they received from the atmosphere, while the washy and putrid effects, the consequence of nutriment, seemed to poison all the rest. The potatoes were nearly in the same condition, the roots all decayed, nor forming any bulbs: but when *peas* or *vetches* were placed in the same ground, they grew remarkably well. Now this is *certainly* a proof that a plant can be destroyed by a decided aversion to the soil in which it is placed; which will, notwithstanding, admirably agree with many *other vegetables*; and that the plant of a poor soil can be as much hurt in a rich one, as the plant of a rich in a poor soil.

I have also known the same disorder seize trees, on being put into ground too rich for them. A friend of mine having just made a garden, which was not yet walled in, left a row of the *salix caprea* in a hedge to shade a walk. Being desirous of having very good vegetables, he manured the ground to the most excessive degree, *even to the edge of the trees*. In two or three years his trees began to decline, and at last got so bad, he consulted me what he should do with them. I advised the taking one for examination. I found most of the wood of the root decaying, while the side radicles were turned into putrid bulbs. We uncovered all the rest of the trees, and flung dry sand on them, mixing it with the earth that surrounded the roots: we saved all *but three*.

In tracing the various expenses necessary to a plant put out of its peculiar earth, I shall first mention *manure* as the most considerable. In proportion as the ground is adverse to the *plant*, so much more does the farmer load it with the only remedy he is acquainted with, "*dressing*," to enable the plant to shoot. If the manure do not afford the juices it requires, and which its natural earth would *certainly* have *bestowed*, the *crop fails*; then the quantity of seeds must be more than doubled, which creates a second expense. Why are they obliged, in one county, to put in so large a measure, and in the next, half the quantity? Because not one seed in three takes effect, from not having those very

juices dispensed to it its seeds seek, and the plant requires to give it vigour and force to grow. The ground is said to be full of seeds: *I believe it*; but the soil can only support such a number of plants; the seeds wait, therefore, till they can possess themselves of that *stimulus* wanted for their increase. Now dung happens to be composed of those ingredients necessary, of that salt and oil required by almost *every vegetable*. If, therefore, the soil be dressed with it, the seeds belonging to each peculiar ground shoot directly; and the sands send up *sand plants*, and the *chalk soil chalk plants*, and so on to the rest: for it is a great mistake to suppose that the embryo plant is concealed in the dung; indeed the vegetable, thus always appertaining to the soil, proves the contrary: but if the manure be not suitable, then that stimulus is still wanting, and the crop is *again said to fail*. How often does this happen; because some bad season makes the want of that peculiar juice doubly missed: then labour is a third expense, which must in excess belong to that plant which is placed in a wrong soil; for it will never be said that the vegetable that can grow spontaneously in that peculiar earth, can want any addition, besides the little manure, to increase its vigour, and render it more productive. All the labour, then, of dibbling, and throwing up the earth, might be saved in that case: indeed, this is a trouble that, I think, (if I might venture to say so,) might be saved in *many soils*. In clays, in chinks, or loams, it must be excellent, where a little motion of the earth round the roots of the plants, and an opening of the ground to admit the air, and dry the interior, must be most wanted, besides breaking the clods of earth; but in sand and gravel, that require no drying, or in a rich loam perfectly pulverized, it only deprives *that earth* of its little *moisture*, and moves the roots, where you would rather wish to render them more fixed and steady in the ground. And if it be on a hill, where the soil falling down renders it thin, I have seen the practice kill many plants, by depriving them of the side thickness and moisture, which would otherwise compensate for the little depth of earth above.

I have now endeavoured to shew, that one of the principal parts of farming should be thoroughly to understand the soil of each field, and its sub-soil, and the *sort of plant* that suits that *peculiar ground*, that the farmer may be able to adapt them to

the earth of which his estate consists; especially where, if he wants more variety, they are to be bought or exchanged with ease. The only desire of most cultivators is to make the farm answer in point of expense. This is all I mean by the plan I am suggesting,—“that that plant will yield a vast deal more in its own soil, and will repay for buying or exchanging that which would not grow without too much expense.” How few are the plants that can possibly be wanted! ten or twelve at most; how easy, therefore, to suit these to his estate! A couple of different kinds of wheat for each soil; oats that agree well with it; and clovers that are naturalized to it. There are some plants that all farmers grow, but that nature seems to have made *as substitutes* to each other, for feeding of cattle; I mean, turnips, carrots, parsnips and cabbage: they each claim a different soil. The turnips do admirably in sand, the carrots in sand also, the cabbage in clayey ground, and the parsnips in good ground: as to potatoes, though preferring a *drained boggy earth* to all others, yet they are *so necessary*, they must grow where they can. But there is a terrible mistake in this country, in supposing they should be planted in dry ground; as the potatoes (I have proved, after sixteen years experience) will never be mealy, if not grown in tolerable *moist earth*. As to the others, one of them might be chosen as best suiting. It is true, that a plant grows sick of the ground in which it is placed too frequently; because the peculiar juices are *exhausted*, which sustained and supported it. But a year's interim is sufficient to renew all, and restore the earth to its usual vigour; especially if a fallow *intervene*, of all the assistance the earth gains, the most *admirably advantageous*; for it is the manure of nature, if weeds are *not allowed* to grow on it: for *if they do*, they rob it of its richness, and burying them can make but poor amends, (by their crude and half-digested juices,) and can compensate but little for the support of a naked winter fallow.

That I should venture upon so daring a task, as to give hints to those very gentlemen who possess *such talents in agriculture*, so famous for their well-earned renown, seems a degree of presumption I must apologise for, as it shocks even myself: but from the first moment of my dissecting plants, I thought it must suggest ideas of this kind, and I have with care collected them.

I may be said to arrive at the science by another road, one untried before, and of course having a different view of the subject. In dissecting, I could not but see that nature had formed the plant peculiarly for that individual soil, and to conform itself to its nature, *in every respect* suiting its defects, and possessing each its proper juices, in chemical affinity *with those* of the soil, but with that one only. Seeing this, may I not, with all humility, declare it, leaving to every one to draw their own conclusions? satisfied, if one hint thrown out can be of service to those whose science enables them to judge so wisely of the matter. In this case I shall be happy in the undertaking, and think myself repaid for my labours.

I shall now give the clovers, and trefoils, &c. adapted to each soil; and should this letter be so fortunate as to please, I shall in my next give the other plants equally suiting each earth.

Clay.

Trifolium minus,	-	-	(Small Trefoil.)
Trifolium filiforme,	-	-	(Slender Trefoil.)
Medicago lupulina,	-	-	(Black Medic, or Nonsuch.*)
Vicia sativa,	-	-	(Common Vetch.)
Poa pratensis,	-	-	(Meadow Poa.)
Hog Peas			
Cabbage.			
Anthoxanthum odoratum,	-		(Sweet-scented Spring Grass.†)
Poa pratensis,	-	-	(Meadow poa.)
Dactylis glomerata,	-	-	(Round-headed Cock's Foot.‡)

Chalk.

Hedysarum onobrychis,	-		(Saintfoin.)
Trifolium procumbens,	-		(Hop Trefoil.)
Poterium,	-	-	(Burnet.)
Trifolium chroleachum.	-		(Sulphur-coloured Trefoil,§)
Phleum Alpinum,	-	-	(Alpine Cats-Tail.)
Trifolium scabrum,	-	-	(Rough Trefoil.)
Anthyllis vulneraria.	-		(Common Kidney Vetch.)

* I have seen this grow six years together, without any dressing, or a very trifling one.

† Excellent in clayey loams.

‡ Excellent for an early cutting.

§ On hills.

Gravel.

<i>Trifolium procumbens,</i>	-	(Hop Trefoil.)
<i>Trifolium medium,</i>	-	(Cow Grass.)

Sandy Soil.

<i>Medicago sativa,</i>	-	(Lucern.*)
<i>Trifolium pratense,</i>	-	(Perennial Clover.)
<i>Trifolium officinale</i>	-	(Melilot Trefoil.)
<i>Medicago lupulina,</i>	-	(Nonsuch.)
<i>Lotus corniculatus,</i>	-	(Common Bird's-Foot Trefoil.)
<i>Plantago lanceolata,</i>	-	(Rib-Wort Plantain.)
<i>Poa trivialis,</i>	-	(Common rough-stalked Meadow-Grass.†)
<i>Thymus</i>	-	(Wild Thyme.)

Loamy Soil.

<i>Trifolium pratense,</i>	-	(Perennial Clover.)
<i>Trifolium repens,</i>	-	(White Dutch Clover.)

And many others.

Very Wet Soils.

<i>Avena pratensis,</i>	-	(Meadow Oat Grass.)
<i>Medicago falcata,</i>	-	(Yellow Medic.‡)
<i>Festuca fluitans,</i>	-	(Floating Fescue.)
<i>Festuca elatior,</i>	-	(Tall Fescue Grass.)
<i>Trifolium glomeratum,</i>	-	(Round-headed Trefoil.)

Grows very full, near wet ground.

<i>Euphrasia officinalis,</i>	-	(Officinal Eyebright.§)
-------------------------------	---	-------------------------

* A trial made in planting lucern in tolerably rich ground, and on poor sand, an equal quantity of manure to both. The first yielded of profit - - 1.6 4 4
The sand, - - - - - - - - - - - - - - 11 5 6

† Though the cattle do not love the leaves, if the *least old*, yet they are very fond of the *seeds*, and they are very flourishing.

‡ Admirable in most soils.

§ I saw a field covered with this, and one the festuca, and they yielded prodigiously.

Very Dry Soils.

Trifolium albidum.	-	(White Siberian Melilot.)*
Anthyllis vulneraria.	-	(Common Kidney Vetch.)
Alchemilla vulgaris,	-	(Common Ladies' Mantle.)†
Ajuga reptans.	-	(Common Bugle.)‡
Hedysarum,	-	(Saintfoin.)

It is a great pity we do not try the *trifolium maritimum*, which all cattle like, and which, if the seeds are raked on the sand in salt marshes, will soon spread themselves all around.

This is but a poor collection; but I am trying each in its own soil, as carefully compounded as I can; and I hope, if the idea should strike as *just*, I shall be able, in most agricultural vegetables, to select sufficient for the farmer, to save all laborious parts of the trial.

Let me not be supposed to say, that each plant will only grow in their original soil; they will most of them live, but they will often fail, get *disordered*, and *degenerate*. It is in this way that grass grows accustomed to its soil, though adverse; but a year or two is not sufficient to reconcile the plant to the soil.

I am, Sir, your obliged humble servant,

AGNES IBBETSON.

The first part of this letter was written more than a year preceding the present time. The trials I have since made have so completely confirmed the necessity of placing each plant in its own proper soil, that the matter will no longer bear a doubt by those who deeply study the subject; for each plant is not only formed by its leaves for the soil in which it was intended to exist, but in the root also; and of course the manner of taking in its nutriment is completely adapted for that soil. Thus, a sand plant takes the greatest part of its nutriment from the

* Admirable in dry sand, if tolerably deep; will spread, as Miller says, without cultivation, if the sand be above a foot deep.

† Spreads excessively.

‡ Very cooling for cattle, and excellent summer food.

atmosphere; it is therefore loaded with hairs of various shapes and figures, which, receiving their juices from the dews, &c. prepare theirs according to chemical affinity, and then permit them (as soon as completed) to run from the hairs into the plant; while the roots (which are often thick and large, but which have very few *radicles*) are almost incapable of taking nourishment from the earth, and therefore the plant depends almost wholly on the exposure to the heavens; and it is on that account peculiarly necessary for these plants, that *aspect* should be most strictly attended to, and that they should be so placed as to face the east or south-east, receiving the morning and evening dew, and not too much exposed, and dried up the rest of the day. To these plants the soil or earth is of infinitely less consequence, than the aspect; and throwing away loads of manure is really expending money without cause or effect; since it will be of little use, except warming the ground, which assists most plants, but to do which only a small quantity of dung is necessary.

For clay plants, which take in less nourishment from their leaves, indeed scarcely *one-fourth*, how different should be the provision the farmer makes for them. The root is formed with quantities of radicles, but all set close round: manure is here, therefore, of great use, if properly adapted; and labour, of still more. No ground costs so much as clay, which should *by rights* be considered in the lease; since to divide, pulverize, and dry, is the principal business of the farmer in clayey ground. Aspect signifies *nothing*, but a summer fallow will always be of admirable service. The root is loaded with radicles, but all close to the spreading part of the root; as the radicles of clay plants seldom like to run to a great distance, for fear of being cut off by the cracking of the clay.

The chalk plant takes much of its nutriment from the earth; this depends chiefly on soil; and adding sand to chalk is often as serviceable as manure; and the being well pulverized and mixed with the sand, is of no little consequence. Here again, therefore, much labour is required: nor is it of less use the ascertaining what sort of chalk it is; some are infinitely more fitted for agriculture than others: some lime-stone or gypsum require only sand to make an admirable mixture; some absolutely require dung to be added to the sand to meliorate the whole.

The water and semi-water plants require *water only*, as food; they take none from their leaves, but have their roots made for the purpose of inhaling water all day, and closing the pipes at night. These, of course, should be placed in very wet soils; and what a pity it is, we do not make use of the *festuca fluitans* in our swampy fields, when *too wet* for common pasture, and where it grows coarse and bad. Then once planting this grass, it would continue to come up each year: it is admirable for food; makes excellent bread, infinitely better than any thing I know, (except the finest wheat;) is good for gruel, and would grow in fields too wet for any corn or good grass. Horses are so fond of it they will half drown themselves to find it; it is particularly good in salt marshes, but grows well in fresh. The *festuca elatior*, which yields still more in fresh water fields, is admirable for grass, though it yields *no seeds*: it is indeed an hybride; but it gives a quantity of admirable grass, which horses will eat, and are extremely fond of; and a very early crop may be had, fit to be cut the end of April. The only disadvantage is, that it cannot be cut without dry weather; or the swampy ground is apt to hurt the men, and destroy much grass.

How necessary is all this knowledge to farmers! What a contrast is the mountain and rock plant! Instead of taking its food from water, as in the last-named plants, it is wholly fed by its leaves; having no impervious skin, (which covers every other plant,) its open pores receive all the juices the atmosphere will bestow. They are so formed, as to take no nutriment whatever from their roots, except what just suffices to form their seeds: the quantity they take in at their leaves is so great, that if the field is on a high mountain, and is well examined with a microscope, even at noon, the plants will almost always be found bathed in dew: many of the clovers, also, are mountain and rock plants, and take in all their nourishment at their leaves, and are constantly seen immersed in dew.

Of what use, then, is manure to such plants? It is throwing away money to expend it, when in other parts of the farm it might be so serviceable: would not this knowledge, so easily acquired, be of the utmost use to both farmer and gardener? So few are the agricultural plants, that rules for this purpose could be most easily given. But let me not be *misunderstood*; in very

poor ground, it is necessary first to bring it from that *sick state* to a *better*; every ground requires some good manure; and this is particularly the case, when exhausted and neglected for many years. Then manuring is the best means to restore it to a healthy situation; and till it has got back to its usual state, it must be treated accordingly. For though sand plants take little from their root, yet that little is a rich part, and requires, therefore, *healthy juices*; which, when the ground is sick and poor, it cannot yield. All this will be made most plain, as well as enforce my first principle, by the detail of the manner of laying down very poor land for grass, which has lately been most admirably exemplified on an estate belonging to a friend of mine, bought for a song, and on which I persuaded him to try the experiment. It was supposed, no vegetable, corn, or grass, would grow on it; indeed, this was the first pleasing intelligence he received from his neighbours. Assured that the matter would succeed, from having repeatedly tried it, I pressed him to manage it in my way, treating his ground like a sick animal, and giving it plenty of wholesome nutritious food; but leaving to nature to bring up the proper grasses, nor counteract her in any way. At first, nothing was to be seen, but the poorest tribe of plants; *agrostis pallidior et canina*,* *festuca bromoides*,† tuft of the *galium uliginosum*,‡ and *galium aparine*, or goose grass. Hawkweeds, wild carrots, and all the sandy plants common to a very poor, light soil; for the soil was sand, with a bottom of yellow stiff clay. I then persuaded him to thoroughly plough the ground *very deep*, mixing the clay and sand very thoroughly together; and over the whole throwing a good dressing of dung. The next year, the *agrostis* had disappeared, the wild carrot also; the *sherardia*,§ chamomile, and rib plantain, were discovered in their stead. *Bromus mollis*, *asperula odorata*, *agrostis littoralis*,|| and *festuca duriuscula*.¶ The next year the land received a top-dressing of a little dung, but a good quantity of earth taken from a ditch, with lime. I examined the grass before it was cut, and with delight saw a quantity of cow grass or *trifolium pratense*; some excellent *bromi*; *festuca ovina*, in perfection, strong and thick; *medicago lupulina*, wild chamomile, rib plantain, &c. &c.; in short, some of the finest grasses a sand soil, in a high

* Brown Bent.

† Brome Fescue.

‡ Marsh Ladies' Bedstrew.

§ Field Madder.

|| Sea-side Bent.

¶ Hard Fescue.

state of improvement, will give. Nor does it want any thing, to preserve it in its present state, but a top-dressing every other year. But this would not be sufficient to keep them in this high state of improvement, if they were not in their own soil: if it was a clay, or a gravel, it would be a totally different set of grasses that would come up, as I have experienced. Some people insist, it is the dung *that brings* the seeds; but this *cannot be* the case; or they would not be always fitted to the soil.

A gentleman consulted me what he should do with his ground, plagued as he was with the *tussilago*.* He had ploughed the whole five times, without effect. I only advised him to dress it thoroughly with dung; and then, the next spring, throw on a fine quantity of sand, for the soil was limestone. In two years after, repeating this again, he had not a plant of the *tussilago* left, though, for five years before, he had been labouring against it without effect: the dung killed the poor plant. Thus, the two principles I wish to enforce in this letter, are,—that the plant *should be suited to the soil*, if the farmer wishes to save himself the *expense* of making the soil suitable to the *plant*;—and secondly, that, in laying down grass, no plan is so good as that of continuing to manure, till the proper grasses (suitable to the soil, and fitted for that degree of cultivation) have established *themselves*. When this is once done, a very trifling assistance, every two or three years, will suffice to keep up the state of perfection in which the ground is placed; for when once the *good sorts* are *established*, (*in sand in particular*,) they require but *little manure*.

Of course, the example I have given can belong to grasses and clovers only, which are *natives*; but exotics require still more to be fitted for the soil in which they are placed; since it is better to have to struggle against climate only, than against climate and soil also.

I am, with the utmost respect,

Your obliged servant,

AGNES IBBETSON

* Coltsfoot.

RUBBING CHEESE WITH RED PEPPER PREVENTS MAGGOTS.—BAKED POTATOES FOR SWINE.

Winthrop, February 13, 1817.

DEAR SIR,

RED pepper, so called, is a complete antidote against flies impregnating cheese, so as to produce maggots. Take one and put it into a delicate piece of linen, moisten it with a little fresh butter, and rub your cheese frequently. It not only gives a very fine colour to your cheese, but it is so pungent, that no fly will touch it.

Instead of steaming potatoes, or boiling them for swine, make an oven near your pen, large enough to contain, say six bushels—heat it and bake them. The heat will continue twenty-four hours. Give them to the swine hot. They are much more grateful to them hot, and they will fatten faster in this way, with, or without meal, than any mode I have tried them. If either of the above hints are worth any thing, you may name them to your Society.

Yours, with every sentiment of esteem,

SAM'L WOOD.

Thomas L. Winthrop, Esq.

**ON THE PRODUCTION OF BUDS, AND SEEDS OF PLANTS,
WITH HINTS FOR THE MANAGEMENT OF FRUIT
TREES.**

[From Darwin's Phytologia.]

WHEN mature fruit, as an apple or a cucumber, fall upon the ground, it supplies, as it ripens or decays, a second source of nourishment, which enables the enclosed seeds to shoot their roots into the earth, and to elevate their stems with greater vigour.

If the seed be deprived of the fruit, it will indeed vegetate but with less vigour. Hence those seeds which are liable to produce too vigorous shoots, as the seeds of melons and cucumbers,

should be washed clear from their pulps, before they are hoarded, and preserved three or four years before they are sown. But those seeds, which are sown late in the season, for the purpose of producing winter fodder, as the seeds of turnips, should be collected and preserved with every possible advantage; and on this account new seed is much to be preferred to that which has been long kept.

Some of the bulbous rooted plants, as the onion and the potatoe, do not flower till the third year, when raised from seed, and then only those of stronger growth. The apple tree does not flower till the twelfth or thirteenth generation of the buds from the seed; each of the buds, in the successive years from the first, producing one principal bud more perfect than itself, and many lateral buds less perfect than itself; that is at a greater distance from that state of maturity, which enables it to form a flower.

The art of distinguishing the greater or less maturity of buds, is a matter of great importance in the management of fruit trees, as in many of them the central bud becomes a spur one year, and flowers the next.

On the stems or branches of trees the buds are of two kinds; leaf buds and flower buds, separate or enveloped in one covering. The bud is termed hybernaculum, or winter cradle of the embryo shoot, and is covered with scales, and often with a resinous varnish, to protect it from the cold and moisture of the ensuing winter, and from the depredation of insects. These by inoculation, or grafting on other stems of trees, or by being planted in the earth, become plants exactly similar to their parents. Every bud of most of the deciduous trees may therefore be considered as an individual biennial plant, as distinctly so as a seed.

The pith appears to be the first or most essential rudiment of the new plant, like the brain or spiral marrow, which is the first visible part of every animal foetus, from the tadpole to mankind. In those plants which have hollow stems, this central cavity, though not filled with the pith, appears to be lined with it. The central pith of the bud is seen to arise near the pith of the parent shoot, where the embryo plumula is probably secreted by a gland at the bottom of the parent leaf stalk, finds there its first reception and nourishment, and is gradually protruded and elongated by the pith, which exists in its centre, as the bud proceeds, and thus constitutes the ascending caudex of the new bud;

which is resembled by the wires of strawberries, and other creeping vegetables; whereas the descending caudexes of the new buds, which form the filaments of the bark of trees, are secreted from the various parts of the old bark in their vicinity.

In those plants which have hollow stems, this central cavity, though not filled with the pith, appears to be lined with it. The ingenious Mr. Bradley asserts, "that buds have their first rise in the pith. They are there framed and furnished with every part of vegetation, and forced forward to meet the air through the tender bark, and would drop on the ground, if they were not restrained by vessels which serve as roots to nourish them; and thus as seeds take root in the earth, a bud takes root in the tree; but with this difference, that the seed has lobes to supply it with nourishment till it can select juices from the earth; but the bud has no occasion for lobes, because it takes root immediately in the body of the tree, where the proper juices are already prepared for it.

Each bud is to be considered as a distinct plant, rooted in the tree. In the spring, when the bud begins to swell, it shoots its root downward into the earth; and the intertexture of the caudexes of the buds constitutes a new bark over the old one of the tree. Each bud then puts forth a leaf, which is a respiratory organ, and resembles in many respects the lungs of animals. As many new embryos are generated during the preceding summer in each leaf-bud, they now put forth in succession; each of which has, like the first, its appropriate leaf, which, as they successively advance, compose the annual shoots or sprigs of trees; which in some plants become of great length, as in vines and willows, consisting of twenty or thirty new leaves. Hence, if the first set of leaves be destroyed by vernal frosts, or by insects, a second set of leaves succeeds, which belong to the second embryos of the same bud.

At the foot of each leaf stalk is generally produced about midsummer, either a new leaf bud or a flower bud; if it be a leaf bud it becomes a branch the next year; if it be a flower bud the growth ceases. During the greater vigour of the plants, the leaf buds are solely or principally produced, as in young healthy trees, but when the vessels of the bark or buds become further elongated, as the plant grows taller, the nutritive juices are less copiously supplied, or the buds are become more mature, the production of

the flower buds succeeds; as in experiments made by Mr. Walker, the sap of the birch tree in the spring, was two or three weeks later in ascending to the top of a high tree, than to the lower branches." *Edinb. Transac. vol. 1.*

Hence it happens, that the grafts from strong seeding apple trees do not bear fruit, till they are twelve years old; while the grafts from old weak trees will bear copiously in two or three years, and hence very vigorous trees, as pears, produce fruit only at their extremities; but if you take off about an inch of the bark from a branch of a vigorous pear tree, and thus weaken it, that branch will flower, and bear fruit at every bud, like trees of less vigour. It should be here observed, that the words, strength and weakness, when applied to the growth of vegetables are, in reality, metaphorical terms; or express the effect or consequence of their producing leaf buds or flower buds, rather than the cause of it, whereas it is the facility with which the long caudexes of the new buds, which form the new filaments of bark, can be generated, which increases the number of leaf buds, and gives the tree a luxuriant or vigorous appearance; and the difficulty of generating these new caudexes, which increases the flower buds, and thus gives a less vigorous appearance to the tree.

About midsummer the new buds are formed; but it is believed by some of the Linnæan school, that these buds may in their earlier state, be either converted into flower buds or leaf buds, according to the vigour of the vegetating branch. Thus if the upper part of a branch be cut away, the buds near the extremity of the remaining stem, having a greater proportional supply of nutriment, and possessing a greater facility of producing these new caudexes along the bark, will become leaf buds; which might otherwise have been flower buds; and on the contrary, if a vigorous branch of a wall tree, which was expected to bear only leaf buds, be bent down to the horizon or lower, it will bear flower buds with weaker leaf buds, as is much exemplified by Mr. Hitt, in his Treatise on Fruit Trees. The theory of this curious vegetable fact has been esteemed difficult, but receives great light from the foregoing account of the individuality of buds.

For the purpose of converting leaf buds into flower buds, Mr. Whitmill advised to bind some of the most vigorous shoots with strong wire, and even some of the large roots; and Mr. Warner

cuts what he calls a wire-worm about the body of the tree; or scores the bark quite to the wood like a screw, with a sharp knife. *Bradley on Gardening, vol. 2, p. 155.*

Mr. Fitzgerald produced flowers and fruit on standards and wall trees by cutting off a cylinder of the bark, three or four inches long, and replacing it with proper bandage. *Philos. Trans. Anno 1761.*

Mr. Buffon produced the same effects by a straight bandage put round a branch; and concludes that an ingrafted branch bears better from its vessels being compressed by the callus produced, where the grafted scion joins the stock.

It is customary to debark oak trees in the spring, which are intended to be felled in the ensuing autumn; because the bark comes off easier at this season, and the sap wood or alburnum is believed to become more durable, if the trees remain till the end of summer, from their expending their saccharine sap-juice in the ensuing foliage, and thus being less liable to ferment and putrify. The trees thus stripped of their bark put forth shoots as usual, with acorns on, the sixth, seventh, and eighth joint, like vines; but in the branches, I examined, the joints of the debarked trees were much shorter than those of the other oak trees; the acorns were more numerous; and no new buds were produced above the joints which bore acorns. From hence it appears that the branches of debarked oak trees produce fewer leaf buds, and more flower buds; which must be owing to the impossibility of their producing new caudexes down the naked branches and stem for the embryo progeny of leaf buds. About midsummer, after the new buds appear in the bosom of every leaf, many authors have remarked, that there appears to be a kind of pause in vegetation for about a fortnight, which they have ascribed to different causes. At this time I suspect the reservoir of nourishment for the new buds is forming about the roots, or in the alburnum of the tree; and that the caudexes or umbilical vessels of the new buds are also at this time forming down the bark, and terminate in those nutritious reservoirs in the roots or new alburnum, like the umbilical vessels, called seminal roots, which are visible in many seeds. The roots of trees at this time sprout with greater vigour, observed by the ingenious Mr. Bradley, who, on that account, prefers the midsummer season for trans

planting trees, if they are not to be removed to any great distance; and adds, that the new shoots in the following spring will put forth with much greater force, and the tree will thence be almost a year forwarder in its growth, than if it remains untransplanted till the winter. This seems to be owing to the destruction of much of the nutritious matter deposited in the roots, for the use of the new buds, which are torn off in transplanting, and which can only be replaced at midsummer, or soon after.

Mr. Bradley further adds, that when trees are thus transplanted at midsummer, no part of the top or branches, or foliage, should at that time be cut off; which well accords with the theory above delivered; but if some of the branches are lopped during the winter, the remainder will put forth more vigorous shoots, as their share of the reserved nutriment will be greater.

The facility with which the ruptured vessels of vegetables grow together or heal, corresponds with that of animal vessels in an inflamed state. Thus, a bud taken from one tree and inserted into any part of the bark of another tree, of the same genus, or ingrafted on it, presently receives nutriment, and grows to it by the reciprocal union of the wounded vessels, in the same manner as a transplanted tooth; or as the fingers are liable to grow together, after having been excoriated by a burn. During the winter, when the leaves die and fall off, the vessels which supplied their juices, and which composed the greatest part of the bark, seem to lose their vegetable life at the same time, and to coalesce, and form the alburnum or sap wood, but the vessels belonging to the new buds, which are intermixed with this alburnum, remain alive; and at the returning spring act with astonishing vigour; and after having drank up the reservoirs of nutriment, which were deposited about the roots, and thus having nourished and expanded the new leaves, cease to act, and are converted into alburnum or sap wood, while the alburnum of the last year gradually changes into hard wood, called the heart of the tree; which no longer possesses vegetative life, and is now only useful to elevate and sustain the young plants which cover it; and was probably originally produced for this purpose in the contest of all vegetables for light and air.

This inert or lifeless state of the central parts of trees, called the heart-wood, is evident from those old oaks and willows, which have lost their internal hard wood, and are become quite hollow,

consisting only of their bark and alburnum, and yet are furnished with many healthy branches. But the umbilical vessels of the alburnum possess the properties of capillary tubes, or of a sponge, after they are extinct, and cease to act as umbilical vessels; and thus may occasionally attract moisture or suffer it to pass through them mechanically. An instance occurred in which a branch of a young apple tree was so cankered, that the bark for about an inch quite round it was totally destroyed. To prevent the alburnum from becoming too dry by exhalation, this decayed part was covered with thick white paint in a few days the painting was repeated, and this three or four times, so as to produce a thick coat of paint over the decayed part, or naked alburnum, extending to the ascending and descending lips of the wound; this was in the spring, and the branch blossomed and ripened several apples. In a garden in Litchfield, about four years ago, a complete cylinder of bark about an inch long, was cut from a branch of a pear tree nailed against a wall, this part is now not more than half the diameter of the same branch above and below it; yet this same branch has been full of fruit ever since, when the other branches of the tree have borne sparingly. I lately observed, that the leaves of this wounded branch were smaller and paler, and the fruit less in size, and ripened a fortnight sooner, than on the other parts of the tree. Another branch of the same tree has a part of the branch taken off about an inch long, but not quite all round it, with much the same effect.*

The existence of capillary tubes in dead sap-wood is visible in a piece of dry cane, these permit water or smoke to pass through them; and in the exhausted receiver of an air pump both water and quicksilver may be made readily to pass through pieces of the dry alburnum of wood by the pressure of the atmosphere.

The choice of buds for the purpose of inoculation is probably of more consequence than has hitherto been imagined. As we have endeavoured to shew, that buds from parts of the bark distant from the central bud, and which are not generated in the bosom of a leaf, are in different states of maturity and require more years before they can produce flowers.

* About seven years ago a button wood tree, on the farm of Benjamin Goddard Esq. in Brookline, was barked entirely round at bottom, a space of from three to six inches in breadth, by the mice; there is no appearance of new bark having been formed in this part since; the tree is, notwithstanding, alive and flourishing, July, 1817.

It is curious to observe, that when harsher fruits become sweeter, the blossom becomes whiter, as is universally seen in those of our native crabs, and of our cultivated apples; and that the buds become larger, and the green leaves also become of larger area and of paler complexion. Thus Mr. Knight observes that "the width and thickness of the leaves generally indicate the size of the future apple; and the colour of the black cherry and purple grape may be known by their autumnal tints; and that even in plants which have sprung from seed in the preceding spring; as the tinging matter in the leaves of these plants is probably of the same kind as that, to which the fruits will in future owe their colour."

The strength or weakness of a tree, which are metaphorical expressions, depends on the greater or less facility with which the long caudexes of the new leaf buds, which constitute the filaments of the bark, can be generated. These caudexes pass along the branches and trunk of the tree from the apex or leaf of the bud in the air to the roots in the ground, and may be distinctly traced in the new twigs of trees. But there is no elongation of the caudexes of the flower or fruit buds, in the same manner; the stamina and coral of each flower, probably, only strike their roots into the sap vessels, like mosses or funguses which grow on trees. Whence it appears that by rendering it more difficult for new buds to acquire new caudexes along the branches or trunk, from the summit into the ground, the tree will be necessitated to produce flower buds in preference to leaf buds:—A theory which explains the whole art of the management of fruit trees. It was asserted by Mr. Lawrence, that the more the branches of any tree are carried horizontally, the more apt the tree is to bear fruit; and that the more upright or perpendicular the branches are led, the more disposed is that tree to increase in wood; which he ascribes to the bending down of the branches impeding the circulation of the sap. Mr. Hitt, in his treatise on fruit trees, affirms, that if a vigorous branch of a wall tree be bent down to the horizon or beneath it, it loses its vigour, and becomes a bearing branch. In Lord Strafford's garden, at Trent-ham, I remember to have seen, many years ago, some standard dwarf apple trees with all their branches bent down, and fixed on a slight frame work about a foot from the ground; which

seemed to be uncommonly prolifick, as a circle of white and purple flowers twenty feet in diameter on branches radiated from a centre, appeared to a distant eye like a carpet of rich embroidery. The greater production of fruit buds on branches bended to the horizon must contribute, I should suppose, to the prolifick effect of training nectarine and peach trees on tiles laid on the ground, or on the gentle declivity of a bank of earth facing the south, which has lately been recommended by some one, who has gained a patent for his discovery ; and it is probable that the labour of training them in this way would be repaid.

The principal art of producing dwarf apple trees to be great bearers, consists in ingrafting them three or four times, scion on scion, so that the vessels shall be compressed by the callus around the engrafted junction, which, at the same time that it prevents the luxuriant growth of the leaf buds, encourages the production of fruit buds.

When young trees discover too great vigour, Mr. Lawrence advises to cut the most vigorous shoots two parts in three through, leaving a large notch that the wound may not heal too soon ; (speaking of wall trees) which he adds will both render them more fruitful, make them more readily conform to the wall or espalier, and preserve such as are dwarfs from too much aspiring in very strong branches, especially of pears. He recommends two or more such incisions to be made in the same branch.

Another method he proposes, is, to break the too vigorous branches half through with the hand, which he has practised with success in apricots and peaches, though some branches have occasionally died by the effusion of the gum.*

In transplanting trees, for any purpose, it may be observed, that they should not be replanted deep in the soil, since the most nutritive or salubrious parts of the earth are those within the reach of the sun's warmth, of the descending moisture and of the air. And as the root fibres of trees, like those of seeds, always grow toward the moistest part of the soil, as the young shoots and leaves grow toward the purest air and brightest light, it follows

* This effusion of gum might be prevented by painting over the wounded part several times.

that the root fibres seldom rise higher in the ground than they were originally set, and seldom elongate themselves perfectly horizontally ; so that when a fruit tree is planted too deep in the earth, it seldom grows with healthy vigour, either in respect to its leaf buds or its flower buds.

Mr. Knight, in his treatise on the culture of the apple and pear, page 83, has this passage. " In the garden culture of the apple, where trees are retained as dwarfs or espaliers, the more vigorously growing kinds are often rendered unproductive by the excessive though necessary use of the pruning knife. I have always succeeded in making trees of this kind fruitful by digging them up, and replacing them with fresh mould in the same situation. The too great luxuriance of growth is checked, and a disposition to bear is brought on." The same observation was made by Mr. Lawrence. So if beans, which are but a few inches high, be transplanted ; they do not become so tall, but they flower and ripen sooner. The same occurs in frequently transplanting brocoli ; the plant does not grow so tall, but has earlier flowers, and in great number ; and it is hence better to pluck them up than to dig them up for the purpose of transplanting them, as it is well known, that the vessels of animal bodies also are less liable to bleed, when they are torn asunder than when they are cut with a sharp instrument. It is probable that confining the roots of cucumbers and melons in small garden pots would stop the too luxuriant growth of the vines, and make them more fruitful, if care was taken to supply them with water more frequently, and with sufficient nutriment, by mixing with the water some of the carbonick black fluid, which has drained from a manure heap.

DESCRIPTION OF AN INSTRUMENT FOR SOWING BROADCAST;—AND ALSO, OF A MODE OF TYING UP CATTLE.

[Extracted from a letter to the Hon. Josiah Quincy.]

[The ensuing communication is from a gentleman in the District of Maine, whose opinion on all subjects connected with agriculture, both from his science and experience, is deservedly of great weight. His name is not connected with the publication, in compliance with his express injunction.]

[See Plate, fig. 2.]

THE implement, which accompanies this letter, I procured in England, and is there called a "*Seed Lip*." They are made of various sizes, adapted to the different uses to which they are to be applied, being larger for lighter seeds. I chose one of a middle size, as the best adapted to common uses.

It is to be placed, when used, just above the left hip, rather before the person, and the left hand to be kept on the upright handle, (*a*) the weight being supported by a strap, or girth, over the shoulder, which strap hooks on to the iron hook (*b*) on the concave side, and remains always over the shoulder, being unhooked when any occasion requires the seed lip to be laid down, to fill it or otherwise. Being suspended by the centre, a motion of the left hand brings the grain to the front, by putting that end the lowest. It is certainly the most convenient thing of the kind we are acquainted with, and is particularly adapted to sowing plaster, which is very tiresome in the usual modes of sowing it, from its great weight. The concave bend in the specimen sent, is not so deep as in the pattern, but could not be altered in the present case. The maker says, if he could get a market for fifty, next winter, he could make them at one dollar each.

Another article sent is a chain to tie up cattle. (See Plate, fig. 3.) Instead of the double stanchion in use near Boston, we have a single round stanchion, about three inches in diameter; and these stanchions are put about three feet apart; the first being set within twelve or fourteen inches of the upper, or farthest end of the stable, giving the last stanchion rather more than three feet between it and the other wall. Thirty-two feet being the common width of a barn,

it then will contain ten stanchions. The *large* ring is put on the stanchion; and care should be taken, that all the chains are put on the same way, otherwise some attention will be required in fastening them. I think that having the ring-ends upwards, is the most convenient. For large cattle, the whole chain is used; and for smaller ones, the T is put through the second ring, instead of the first. Getting loose with these chains (unless by breaking) is nearly impossible: and if well made, very little danger of breaking is incurred, except by the cattle, as driven in in cold weather, treading on them when the iron is brittle from frost. This is easily avoided by having a pin, on which to hang the extremity of the chain; which will then be suspended in its whole length, with the larger ring confining the middle, and be in the most convenient position possible for the person who ties the cattle. The only caution necessary is, to be sure that the T is *fairly drawn through the ring*. The backs of *two* old scythes make a chain, exclusive of the large ring, or runner. The web of the scythe should be taken off; for it renders it brittle. The expense is under a dollar each.—I have had them in use ever since the year 1801; and I see no reason why they should not last fifty years longer, as the wear amounts to nothing.



SKETCH OF THE CHARACTER OF WILLIAM WEST, A DISTINGUISHED FARMER OF PENNSYLVANIA.

[Volume second of the Philadelphia Agricultural Society's publications, contains a sketch of the character of William West, from which an abstract is here published. In one of our late numbers will be found some account of the distinguished Swiss farmer, Klyiogg, extracted from an account of him, published at Hallowell, in 1800, in one volume, 8vo. by one of our ablest and most valued citizens, from an English edition. The lives of such men afford a full answer to those who call in question the profitableness and dignity of agricultural pursuits. Industry, care, and skill are seen to be as certainly, and as amply rewarded in the career of the husbandman, as in that of the merchant. An honourable independence is equally within the grasp of both. Some illustrious instances there are of men, in our community, who, while extensively engaged in commerce, and still in the

meridian of life, have diverted an ample portion of their fortunes into the channels of agriculture, and have afforded, in many things, a valuable example to the plain farmer, and a noble and important patronage to this class, in the free distribution of new seeds, and scions of improved fruits, and in experimenting new modes of culture. We have seen them fertilizing, beyond example, our lands, naturalizing the productions of other climates, enriching our fields with new grasses and a brighter verdure, and our gardens with new varieties of roots and fruits, and blending a liberal display of elegance and taste, with a skilful and profitable husbandry. Distinguished among this class of patriotic men was the late EBENEZER PREBLE, Esq. for many years one of the most intelligent, zealous, and useful members of the Board of Trustees of the Massachusetts Agricultural Society.]

MR. WEST* was born in the year 1724, and became a farmer at the age of forty, when he purchased a farm of one hundred acres, which, although by nature of an excellent soil, had been so far exhausted, as to be incompetent to the maintenance of the owner, few and simple as his wants must necessarily have been.

The business of farming may be said to have been new to Mr. West, for although he had a general idea of the common operations of husbandry, yet he must have been very deficient with respect to the various minor details, upon which so much of the success and profit of a farm depend. The land he bought was almost a common; there being scarcely a fence of strength sufficient to keep out whatever animal chose to walk over his fields, and they were covered with briars and weeds of every kind. In these respects his farm was not singular; all the agricultural operations of the districts were the reverse of what they ought to have been, and of what they now are. After fencing his land by substantial inclosures, and clearing it of weeds, briars, and wild hedge rows, he looked round for his information, as to the best mode of conducting his farm. He saw cattle half starved in winter for want of food, and pinched with cold from deficient shelter, and but poorly fed even in summer. Grass was the result of the spontaneous, though scanty production of the soil, after the crop of grain was taken off, or, in a few cases of natural rough meadow, or watered fields. The provision of hay was extremely poor. The consequence was, that the stock kept was small in number; or, if the vanity of showing a large stock

* Eldest brother of the celebrated painter, B. West.

infected the farmer, they were of course but half nourished. In either case, manure was scantily made. Successive crops of grain exhausted the ground; the slovenly practice of sowing wheat, or rye, among the standing Indian corn, was universal; and the cultivation of artificial grasses, especially of that great fertilizer *red clover*, which has done so much for Pennsylvania, was unknown. The cattle were, therefore, permitted to wander over the fields to pick up the slender provisions afforded by nature, or to brouse upon young twigs in the woods, to the certain destruction of the growing timber. Grazing, at that time, was solely confined to the rich natural meadows on the peninsula, between the rivers Delaware and Schuylkill, and many farmers depended entirely upon them for the supply of their winter beef, and even for part of the hay for their live stock. In short, he found that the whole management of a farm was pursued, not upon fixed principles, but in a random manner, the object appearing to be, to obtain as much from the land as possible, without regard to the preservation or improvement of the powers of the soil. With these facts before him, the prospect was extremely discouraging. He did not pretend to any knowledge in farming; but what he saw and learnt was sufficient to convince him, that practices, which neither enriched the farmer nor the land, could not be the most eligible, and he, therefore, determined not to adopt them; and as he could derive no information from his neighbours, he read what books he could procure on farming, and for the rest he depended on his own judgment. At that day, the science of agriculture was at a low ebb, in every part of the European and American world. The useful spirit for diffusing information, by means of books, was not excited in this country; and even in Europe, scarcely any works of much note had appeared on agriculture, except those of Du Hamel, De Lisle, and Tull. The merit of Mr. West was, therefore, the greater, because without the numerous helps which the modern farmer may have recourse to, derived from the works of those who have detailed the result of their experience, or from the good examples of their neighbours, he ventured to alter a bad system, and to establish a new one, which the experience of near half a century in this country, has shewn to be correct, and which has added to the pecuniary resources, and agricultural reputation of our state.

The chief part of the cultivated land in Pennsylvania was in a course of tillage, and grain commanded but a small price. The business of grass, as already stated, was confined to a small district; and the inquiries he made satisfied him as to the superior profit arising therefrom, when compared to tillage. From this circumstance, therefore, as well as from a partiality for that pleasing branch of husbandry, he resolved, as soon as circumstances would permit, to lay down his land to grass.

The introduction of red clover had taken place only a few years before, and, with the exception of a few districts, was confined to the vicinity of Philadelphia; for prejudice, the great enemy to all improvements, had opposed its progress among the cultivators of the soil. The great advantages, however, of this valuable grass, derived from the immense burden which it produced, were soon seen by Mr. West, and he determined to avail himself of them. Its fertilizing effects were the result of subsequent experience, the knowledge of which, from the recent and partial use of the plant, was yet to be acquired. Clover was therefore sown, and his fields soon bloomed with the novel exotic, affording him treble the quantity of hay, that ever had been known to grow in the vicinity, upon the same quantity of ground. But clover, valuable as it proved to him, and as it still is, he knew required to be renewed, and a permanent pasture was the object to be aimed at, for he held it as a principle, that every country was blessed by a native permanent pasture grass. How, therefore, was this to be obtained? It occurred to him, that a visit to the peninsula, where native grasses abounded, and an examination of the soil on which they grew, might teach him something on the subject. He there saw, that the whole soil was alluvial, and of course very rich; that luxuriant, natural grass clothed the fields, and that the only manuring they obtained, consisted of the droppings of the cattle. Here, then, were the principles upon which the improvement was to be grounded. Manure was applied as equally as possible, to the *surface* of a *rich bottom*. Philosophically concluding, that like causes must produce like effects, he determined to imitate the practice, and the result proved the accuracy of his deduction. The first object, therefore, to be attended to, was to bring his soil, if possible, to the desirable state of fertility of the alluvial district,

and this he knew could only be accomplished by the accumulation of manure. How, therefore, was this great desideratum to be obtained, and how increased? It was clear, that the wandering of the cattle over the fields and roads, or in the woods, could not add to the stock of this great requisite; for, in the one case, it would be lessened in quantity, and diminished in quality, by the action of the elements upon it; and, in the other, it would be totally lost. He, therefore, confined his cattle to the barn yard, during the winter, and to increase the quantity of manure, he, in the first instance, plentifully strewed the yard with leaves from his woods, while the scanty crop of straw, corn-blades, and corn stalks, which his first course yielded, assisted in supplying food.

The sites of the old fences he had removed, the earth under the wild hedge rows, which he had previously grubbed, was ploughed up, and together with that taken from the ditches he dug or cleaned out, was formed into a compost, containing a large proportion of lime; while every species of offal and vegetable matter about the dwelling house, and innumerable weeds, while yet unripe, were added to the contents of the barn yard. He provided against drought by leading a spring from a considerable distance along his high lands, so as to irrigate at pleasure some of his largest fields. The precious water from the barn yard, which even to this day is either entirely lost, or permitted by most farmers to run off in wasteful profusion over a particular field, was confined by the construction of the yard, and forced to increase the riches of the fresh materials which were continually in progress to the fertilizing heap.

To all his grass grounds, previously cleansed of perennial weeds by fallow crops, he applied a compost manure early in the spring, always observing to accommodate it to the nature of the soil. He had the satisfaction to see the complete success of the practice. For as the artificial grasses declined, the permanent native green grass* took their place, and only required a repetition of the practice which caused its appearances to ensure its continuance; and for many years he exhibited the only instance in the county of an entire sward of green grass upon

* *Poa viridis* of Dr. Muhlenberg.

an upland farm, and of fields which had not been disturbed by a plough for upwards of thirty years.

The alteration of the farming system of William West, from the random plans of the country, did not fail to be noticed by his neighbours, and in some of them to excite animadversions; and as in every instance of deviation from prevalent customs or practices, predictions of failure were with great confidence generally made. The event however, proved the incorrectness of their predictions. In the short space of three years, his supply of provender was so great as to enable him to sell hay to a farmer who possessed a much larger tract of land than his own, and who had indulged himself most freely in objections to "the town-man's farming." The people of the vicinity saw with astonishment, field after field, covered with heavy pasture, which formerly were distinguished by the great quantity of briars, and in a few years, they were surprised to see forty head of cattle brought to a farm to graze, which had scarcely ever afforded a bare support to ten head before; but they wondered still more when those cattle were successively led to the capital by the butcher, and moreover were informed, that a large dairy and farming stock were supported during the same season. Such a change could not fail of exciting more remarks than his deviating from the common agricultural system of the country, had formerly produced. In the one case, some little pride was mortified, at seeing the successful practice of a citizen, in the improvement of land by courses, which were so opposite to what farmers thought could not be altered for the better, or the adoption of measures which had either never reached their ears, or were slighted from prejudice, or neglected from want of industry; in the other, the more feeling principle of interest operated to the production of remark, and to a gradual change of their agricultural operations. This change he lived to see effected, not only in his immediate neighbourhood, but in more remote places, and to behold farms, nay, whole districts, brought from a state of poverty to a state of high cultivation, by following the example he had long before set.

When the theory that explains the success of improvements, or the practice of them, has become familiar to us, we wonder that what is so easily accomplished, and is so simple, should have

been so long concealed from us, or have been so recently adopted, and this remark will apply with particular force to the present occasion. The practice of producing a fine sward upon upland farms, by the application of manure to the surface, now appears so simple, that it strikes us with astonishment the thought did not occur to others at a more early period; but this wonder will cease when it is known that even to this day, in many parts of the country, the benefit of it remains yet to be discovered. Men who believe the system of farming they pursue admits of no alteration for the better, will of course despise all information derived from agricultural publications; and those who deem it a misapplication of time, or who are afraid that it will be deemed an acknowledgment of their own inferiority to go expressly to view the farms of others, will of course long continue in the practice of their forefathers, however erroneous, and adopt all suggested improvements with caution and reluctance.

It is indicative of Mr. West's disposition to improve, and an evidence of his freedom from prejudice, that he at a very early period adopted the use of gypsum as a manure; conscious that he had much to learn, he was always on the search for information, and he no sooner heard of the beneficial effects which had been experienced from that singular substance, on some of the city lots, than he made further inquiry respecting it, and saw and heard enough to satisfy him as to its utility. Without therefore hesitating as many did, because he could not account for the theory of its operation, he resolved upon its use. The first season convinced him that it was a most important acquisition to the farmer, and the experience of every subsequent year confirmed him in the opinion he had at first adopted. He defended it against the futile and weak objection which he frequently heard urged against it, that it acted upon vegetables like ardent spirits upon the human body, and like them must finally exhaust the powers of the land. He would remind its opponents of the means which it furnished of adding to the vigour of the soil, by means of the great quantity of manure, afforded by the additional number of cattle, which could be maintained from the grass it produced, and which would tend far more to invigorate the soil, than the gypsum would to exhaust it. Much of the fertility to which his farm had reached, he ascribed to the use of that impor-

tant substance, and his continued confidence in its powers, occasioned the general and extensive use of it in his neighbourhood.

A visit to his farm was well repaid; one saw every thing about the land bearing the strongest marks of industry, care, and skill. The most luxuriant grass every where met the eye; not a weed was to be seen; the fences in the most perfect order, a compost bed ready prepared or in preparation, in the field next to be dressed, and every improvement effected in the most substantial manner. His industry was, indeed, unceasing; for he held it as a point of duty "in every man who occupies land to endeavour, as far as capable, to keep it in an improving state, for the benefit of himself, his connexions, the publick, and posterity. And he who can make an addition or improvement, though small to what is already known, would be doing more good than giving alms all the days of his life."

The construction of his stables, and the accommodations for his cattle, all designed by himself, are superiour to most I have seen; and his stalls are referred to as models worthy of imitation, in two respectable British agricultural publications.



ON OAT PASTURE, AND IMPROVEMENT OF SOILS.

[Philad. Agri. Pub. Vol. 2.]

It is generally acknowledged, that the best land may be reduced to sterility, from an injudicious rotation of crops. It remains in a great measure to be proved, whether a farm, which, from bad management, has been rendered barren, can be restored to its pristine fertility, by a treatment not beyond the reach of every farmer, who possesses the land free from incumbrances which are nearly equal to the supposed value of his worn out farm.

When an inquirer examines the publications of those, who have given the results of their experiments, it appears not only practicable, but easy: frequently, however, some circumstances are not mentioned in the communication, or some thing not attended to by the reader, who intends to make the same successful experiments, but fails, from the causes stated.

The Rockland farm exhibited a subject for experiment, as it had not only been reduced by cropping, but generally, became a common for every animal, to take what remained of the scanty natural, but coarse herbage. Having read in various books the result of sowing plaster and clover, it was presumed, that sowing plaster and clover would be the extent of the expenses required to fertilize the fields, in a few years :—a few experiments proved, that the plaster and seed were both lost, as no one could, at any season of the year, point out what field, or upon what part of any field they had been deposited, unless, where the briars and bushes had been eradicated.

It should, however, have been mentioned that the soil was, generally, a cold clay, loaded with hard blue stone and rocks, chiefly quartz mixed with iron and copper. Some of the experiments were made with plaster, others were made by top dressing with lime, at the rate of twenty-five to thirty bushels per acre : it was formed into a bed of about half a foot thick, and covered with earth, ploughed and thrown over it, before it was slacked. A heavy harrow was afterwards passed over it, so soon as the lime was reduced to powder ; the bed of lime and earth was then frequently turned by the plough and harrow, until the whole assumed the appearance and smell of soaper's ashes, containing about ten parts of common soil to one of lime. It was then carted and spread regularly over the field, and in every instance it gave a return of clover, equal to ten loads of stable manure to the acre. The idea of mixing the lime and earth ; was suggested from spreading the refuse mortar of lime and sand, gathered from the above buildings, and laid upon the field, the effect of which I observed was more immediate than any equal quantity of lime ; though mixtures of lime and earth were equally so, in both cases the lime was equally pulverized, and the sand and earth broke up the communication of lime with lime, and the succeeding rains carried the fertilizing principle of the lime, as from a sieve, into the soil where it was spread ; it completely divided the soil, rendering that open and warm, which before was compact, and too cold for the roots of the grain to live in.

The whole soil, which before felt dead under foot, became so elastic, that persons of observation, by walking over the field in the night, distinctly told how far the lime compost and earth

extended. The colour of the soil was likewise changed into that of chocolate.

These effects presented several ideas, which had not occurred to me before; viz. that any thing which would separate the particles of the soil, and admit the air, would render these cold and heavy clays warm and fertile; that the free intercourse of air would carry off the acid. To meet this, ploughing in the fall was adopted, and found successful; one half of a field six years ago was ploughed in the winter, the other half ploughed in the spring; that part which was ploughed in the spring, had never brought grain or grass equal to the other. It should have been observed, that the field had not been ploughed for upwards of twenty years, and of course, a great body of rubbish and roots were ploughed in, after the briar hook and grubbing hoe had smoothed the surface. Spreading manure in the autumn from the compost heap has also been introduced with universal success, both upon grain and grass fields; the lye or salts of the manure being carried into the soil by the rain, upon the breaking up of the frosts, which have in some measure prepared the soil to receive it. High agricultural authorities, even bottomed on accurate observation, are opposed to the practice of spreading out manure in autumn; amongst these we find the justly celebrated Lord Kaimes, in his *Gentleman Farmer*, a work upon first principles, and deservedly of the highest authority. A departure from his judgment would only be allowed, where facts would censure silence; nor should his name have been mentioned, unless to avoid the charge of writing without attending to what has been said upon the subject. It is no conclusive objection, that "the strength of the manures will be carried off by winter rains, or exhausted by the frost." Are not the warm rains more exhausting, and are not the exhalations more copious in a warm, than in a cold temperature? Is the descending of the same in trees no monitor, as to the season for spreading out manures, and about the operations of nature, for renewing and invigorating the process of vegetation?*

* Marshall, in his "*Minutes of Agriculture*," has some very judicious remarks on the application of manures. A *clayey* soil, in winter, he says, resembles a sponge filled with water, and whatever is then put upon it, will not penetrate, but remain on the surface, liable to be washed away by the rains, or to be evaporated. But in

Briar bushes, and all vegetable substances, have been covered up with earth, rotted, and used with the same success as stable manure, and so far, and so long, as they separate the parts of the soil, and admit the air, they fertilize and change the colour of the mould. These experiments, tested by frequent repetition, have laid a foundation for experiments less expensive, and equally fertilizing, for the production of grass and grain.

Ploughing and sowing, for the purpose of producing pasture, and accumulation of vegetable soil, have been adopted. For this purpose, wheat, rye, Indian corn, buck wheat, and oats, have been sown upon fields ploughed, which were incapable of producing any crop; none of these grains have produced pasture and vegetable soil equally valuable with that from the oats. Where the others have failed, its roots have pierced, disarmed, and vanquished the inhospitable soil, and rendered it fertile; the winter ploughing is continued, and the oats are thrown in early as the season will allow, sometimes, even in February; either upon what has been ploughed in autumn, or in the fields which were in corn the preceding year, or in pasture oats, the preceding fall. In general, they afford early pasture, and when they are reploughed in July and August, and sown again with oats, they furnish excellent pasture, from early in September, until late in December, during that season when all other pasture is usually dried up. The first sowing of oats gives only about two months pasture, but the roots and remaining herbage affords a manure for the second sowing, and this always yields four months valuable pasture, which no other course known to me will afford. In September, October, November, and December, considerable attention is required, to preserve the young clover, which the field will be able to raise in the second year of the oat pasture: if sown with the oats in the spring, the cattle should never be put in while the ground is too moist, as they would destroy and tread it into the soil; and sometimes, dry seasons are

summer, such a soil, whose absorbent power, as well as its power of retention, is very great, greedily absorbs the moisture applied to it. The danger in applying manures to light open soils, in the spring or summer, is, that as fast as it liquifies, it will be hurried through the vegetative stratum. In winter, the absorption is more gradual, and there is greater probability of the strength of the manure being incorporated with the soil, than of its descending into the subsoil. EDIT.

Vid. page 298, of No. 3, Vol. 4, Massachusetts Agricultural Repository.

also highly injurious to the clover. When the clover is sown with the second sowing of oats, the same care is required to prevent its being trodden in by the live stock, for this purpose it is always necessary to have a spare field of old pasture, which they will feed upon in wet weather, and which they would not relish in dry weather.

To guard against a dry season, it is most proper never to pasture the oats, where the clover is sown, so much, as to prevent the herbage of the oats from giving shade to the clover. So soon as the field will produce clover luxuriantly, there is no farmer at a loss how to make his fields as rich as he pleases; and having got them into good heart, it will be for his interest to put them in such rotation, as shall increase the vegetable soil, and consequent fertility of his fields.

It is almost unnecessary to mention, what will make its way to the understanding of every farmer; viz. the many advantages gained from treating his barren field in this way.

1st. Early and late sweet pasture from such fields, which otherwise, produces a scant coarse herbage, unpalatable to every animal.

2d. Immediate reward for his labour; the stock are supported by it within two months from the time seed is sown: the two returns give six months green food; he is not however, to depend upon it for all his summer pasture.

3d. It is an easy and profitable way of clearing grain fields from weeds, as it will convert them into vegetable soil, and enable the farmer to raise whatever grain or grass he shall judge most suitable to the soil.

4th. It enriches the farm from within itself, and no expense is required beyond the reach of any farmer: by rising one hour earlier, and working one hour later than usual, he may, for two weeks, plough and sow two acres, as an experiment. The pasture will recompense his labour, while his soil will be greatly improved. It is equally evident, that the fertility of the soil is acquired, partly from the roots of the oats, opening the soil and introducing the air and warmth of the sun, and partly from accession of vegetable soil, produced from the decomposed roots of such pasturage; but even before the roots are converted into soil, they produce the most beneficial effects. Those from the

spring sowing, retain the moisture and supply the summer sowing with it. The roots, from the fall pasturage, being full of sap, introduce winter frosts every where into the soil, which, swelling with the congelation, separates the particles; for it is to be observed, that roots, while the stem is eaten down, do not become hard, but are more numerous, than when the plant is matured into grain. It is however, necessary to sow at least double the quantity of seed, to that required for crops of grain; the pasture being so much the thicker, and the increase of vegetable soil from the decayed roots so much the greater.

It is not to be expected, that one or two repetitions of the series of oat pasture, will make the soil equally rich as a common dressing of stable manure, which, from a farm of one hundred acres, will not in general extend over more than ten or fifteen acres; this gives to one acre nearly the vegetable soil produced from seven or ten acres. It is to be remembered, that the object proposed is to render worn out, or barren fields, productive; and in no case have I found a field which was not, after two years oat pasture, capable of producing clover, and received the gypsum with evident advantage. It is in every one's power, to estimate what the ploughing and seeding per acre of oat pasture will cost, and according to circumstances, so will the expenses be; but, in general, where the expenses are high, the value of the pasture is equally so; and if even granted, that the cost of ploughing and seeding be double in value to the pasture produced, let the comparative value of the field be fairly estimated, before the course was begun (a waste, or worn out field) and what it is now, when the course is completed and laid down in clover or other grass.

It will be of the first importance to have at least two, otherwise, if the cattle are constantly upon the same field, it will not be found so productive, and, in wet weather, they should be turned into some field where the herbage was too hard in dry weather. It will be eaten greedily by the cattle, after they have been satiated with the soft blades of the oats. Under this management, beeves have been fatted for family use, and taken off in December without any grain. It is observed, that the oats scour at first, but the free use of salt readily corrects the complaint, and in no pasture do they rise faster in flesh, and the juices of their meat are uncommonly grateful.

The fields, which have been in corn the preceding year, have also been sown in the spring, without being reploughed, and have done equally well, except upon heavy clays, when the spring has commenced with heavy rains, which have rendered the soil too compact to be opened, even with a heavy brake harrow, drawn by four horses. The fields, from the oat pasture the foregoing autumn, have also been sown without reploughing, when the spring has set in without much rain, after severe frost: not only the oat pasture, but the clover sown therewith, have answered well.

Oats have, also, been sown among the hills and drills of corn, after it has received the last dressing. It has succeeded without any visible injury to the corn, provided care has been taken not to injure the roots by the plough or harrow, at the time the oats were sown.

It has been inquired, are not all crops of oats exhausting? If so, how can two sowings of oats in the same year, render the soil fertile? It is granted, if oats shall be matured into seed, they will certainly exhaust; but if cut off while in the blade, they, and all culmiferous plants, will fertilize. The experiment was made with Indian corn, sown broadcast, cut twice, and carried to the stable, and a crop of turnips taken off the ground the same season: the manure was laid on before the corn was sown, but none was given when the turnip seed was put in.

Another way, in which oats fertilize, appears to be from increase to the vegetable soil; this is within the view of every observer; the remains of the pasture ploughed in, particularly in July and August, is speedily decomposed, its tenderness and moisture aiding the dissolution. But dry stubble and husky roots are with difficulty decomposed; nor do they produce so much carbonic or coally matter in the soil, which chemists say decomposes the water, and produces the air required to promote vegetation. As the vegetable is produced from air and water, and not from earth, which seems to be no more than the laboratory where the process of vegetation commences, and, finally, serves as a matrix to hold one part of the plant, while the other parts are raised aloft in quest of superior aid, to complete the inscrutable operations of the vegetable fabric. It has also been inquired, will this process of oat pasture fertilize every where? It

is answered, that where the soil and climate are the same, the effects will be the same also. A description has been given of the soils, where the experiments were made, and are still going on. If experiments of the same nature shall be made upon a different soil and climate, the result will be different, and more or less favourable, according to circumstances, and for which the practice now mentioned cannot, in justice, be rendered accountable. Whoever makes the trial should be careful not to take a crop instead of the pasture in the spring. If it shall still be inquired, how does the oat pasture fertilize? It may be also observed, that the constant verdure and green herbage prevent the rays of the sun from parching the soil, and depriving it of its moisture and air, both of which are highly necessary to vegetation. The double portion of juicy vegetable matter, arising from the two crops of pasture in the same summer, being every where united with the common soil, partly mechanically and partly chemically, renders the soil capable of retaining sufficient moisture and elastic air, to make it open and warm, and by which the soil does not only become thicker by going downwards, but actually expands or rises, so as to give a furrow considerably deeper than formerly, over immoveable rocks. Some years ago, a field in view of the farm house, marked the broad rocks, during the course of every crop; they are now covered with so much soil, that they are seldom observed. The two ploughings *also* contribute to the increase of the air in the soil, without which no soil can be fruitful. Tull's horse hoeing husbandry was introduced under the idea, that the *pabulum* of plants was pulverized earth; the fact daily before us, that *pulverized earth retains the moisture and air, as the handmaids of vegetation*. Some experiments have lately been made, the results of which favour these remarks, viz. that *soils* afforded quantities of *air* by distillation, somewhat corresponding to the ratios of their value.

Note, by the Editor of the Philadelphia Agricultural Memoirs.—
The samples of soils (treated according to the method recommended above) sent by Mr. Young, exhibited the most marked difference. The progress, from absolute sterility to rich mould, might be traced by the colour of the several parcels. I, with great pleasure, bear testimony on the subject of Mr. Young's

improvements. In the years 1806 and 1808, I saw cattle feeding in good pasture, and good crops of grain and grass growing in fields, which, in 1804, I thought totally irreclaimable from briars, garlic roots, and original poverty of soil. Where manure is at hand, and capital in the possession of the cultivator to purchase it, any soil may be rendered fertile; but Mr. Young affords the best example of good farming, viz. enriching a naturally poor soil, and restoring fertility to exhausted land, by returning thereto its own produce, raised with the least possible expense.

J. M.

MR. BENJAMIN HALE'S ACCOUNT OF THE SAVING MADE
BY THE USE OF HOTCHKISS'S STRAW CUTTER, EM-
PLOYED TO CUT HAY AND STRAW AS FODDER FOR
HORSES.

MR. HALE is proprietor of a line of stages running between Newburyport and Boston. He says,

The whole amount of hay purchased from April

1, to October 1, 1816, (six months) and used *Tons. cnt. q. lb.*
at the stage stable, was - - - - 32 4 0 10

At twenty-five dollars per ton (the lowest price
at which hay was purchased, in 1816) - - \$800 00

From October 1st, 1816, to April 1st, 1817,
whole amount of hay and straw purchased
for, and consumed by the same number of
horses, viz. *T. cnt. q. lb. Cost.*

Straw - - 16 13 3 10 \$160 23

Hay - - 13 14 1 00 350 00

\$510 23

Deduct, on hand April 1st, 1817, by
estimation, four tons more than there

was Oct. 1st, 1816, at \$25 per ton 100 \$410 23

Saving by the use of Hotchkiss's straw cutter,
four months of the last six months, or the dif-
ference in expense in feeding with cut-fodder
and that which is uncut - - - - \$389 77

Whole amount of hay used for the horses of the Salem stage, twenty-five in number, from April 1st, to October 1, 1816, viz.

	<i>T.</i>	<i>cnt.</i>	<i>q.</i>	<i>lb.</i>	
October 1, 1816, viz.	22	0	0	0	
At \$30 per ton (the lowest price in Salem)					\$660 00

Whole amount consumed by the same number of horses, from Oct. 1, 1816, to April 1, 1817.

	<i>T.</i>	<i>cnt.</i>	<i>q.</i>	<i>lb.</i>	<i>Cost.</i>	
Straw - - -	15	13	0	0	\$187 80	
Hay - - -	2	15	0	0	81 09	\$268 80
Saving in using chopped fodder five months						391 20
Total saving in using the straw cutter nine months, viz. at Newburyport four months -						389 77
At Salem five months - - - - -						391 20
Total - - - - -						\$780 97

The member of the Board of Trustees of the Massachusetts Agricultural Society, to whom the above account was communicated by Mr. Hale, was informed by that gentleman, that he used no more grain from October, 1816, to April 1817, than was used from April 1816 to October 1816.

MISCELLANY.

THERE is an experiment related by Dr. Roebuck, in the Edinburgh Transactions, Vol. I, which seems to shew, that the grains of oats continue to fill and to become heavier even during the autumnal frosts, which may, probably, be the case during the sunshine of the middle part of the day, as occurs in the vernal frosts of this part of the country. In 1780, near Burrowstoness, the oats were green even in October, when the ice was three-fourths of an inch thick. He selected several stalks of oats of nearly equal fulness, cut half of them, and marked the remainder,

which continued fourteen days later in the field; after being dry the grains of each parcel were weighed, and eleven of those grains, which had remained in the field, weighed thirty of those which had been cut a fortnight sooner.

This important experiment should teach our farmers not to cut their peas and beans too early in inclement autumns; which are so frequently seen to become shrunk or shrivelled in the barn or granary, and inclined to rot from deficient ripeness, and consequent softness or moisture; and thus contain much less flour, in proportion to the husk or bran.---*Darwin's Phytologia*, p. 406.

The Bredon lime stone, in England, contains magnesia, in the proportion of one half, and is valuable as manure, in soils which abound with vitriol of iron, or with gypsum (plaster of paris) as the magnesian earth would unite with the vitriolic acid, and leave an ochre of iron in one case, and lime in the other; at the same time a soluble salt, called Epsom salt, would be formed, which, according to the experiments of Dr. Home, promotes rapid vegetation.---*Darwin's Phytologia*.

It will be found advantageous to steep many kinds of grain in the black liquor which oozes from manure heaps. It is believed in China to forward the growth of the plant, and to defend it from a variety of insects, according to the information given to Sir George Staunton. Mr. Chappel, as mentioned in the Bath papers, found great benefit by steeping barley in the fluid above mentioned, for twenty-four hours.

Whether Beans and Peas, or Oats, are preferable in respect to economy, as provender for horses.—A bushel of oats weighs, perhaps, forty pounds, and a bushel of peas and beans perhaps sixty pounds; and as the skin of peas and beans is much less in quantity than that of oats, I suppose there may be fifteen pounds of flour more in a bushel of peas and beans, than in a bushel of oats. There is also reason to believe that the flour of beans is more nutritive than that of oats, as appears in the fattening of hogs; whence, according to the respective prices of these articles, peas and beans generally supply a cheaper provender for horses than oats, as well as for other domestic animals. But as

the flour of peas and beans is more oily than that of oats, it may in general, be somewhat more difficult of digestion, hence it may be found expedient to mix finely cut straw with them.

Gardeners, in general, prefer new seeds to old for their principal crops, as they are believed to come up sooner, and with greater certainty, and to grow more luxuriantly. But peas and beans of a year old, Mr. Marshall observes, are by some preferred to new, as not so likely to run to straw. And cucumbers and melons are best to be several years old, as they shoot less vigorously, and thence become more fruitful. But this principle is carried too far by some gardeners, who say, these seeds cannot be too old, and will allow ten years to be within bounds; three for cucumbers, and four for melons, however, is age enough.

Peas and beans, says Marshall on gardening, will germinate very well at seven years of age; but the seeds of lettuces and kidney beans, and some others, are not to be depended upon after a year or two, and, generally speaking, the smaller seeds are of the least duration.

[The following Certificates, in recommendation of Mr. Luke Johnson's apparatus to facilitate ploughing, were not received in season to be inserted with Mr. Parsons's Letter on the same subject.]

Brighton, July 11th, 1817.

SIR,

IN conformity to your request I have the satisfaction of stating to you my opinion of your new invention for assisting in ploughing. During the time we made use of it, I was convinced that it saved a very considerable part of the team, that would otherwise have been required; besides, I have observed the cattle are relieved, in consequence of lessening the pressure on their necks, and the plough runs more steadily. We were convinced of the utility of the machine, having attempted to plough a piece of land without it, I was necessitated to leave it for the want of more team. The following day, with the same team and plough, and with the assistance of your machine, we were enabled to plough the land without difficulty.

Respectfully, yours, &c.

FRANCIS WINSHIP.

I the subscriber having made trial of a machine, invented by Capt. Luke Johnson of Leominster, for the purpose of aiding cattle in drawing a plough, am satisfied that ploughing may be done with said machine, with about one fourth part less power than without it; also, that the hinder cattle are relieved from the heavy pressure on their necks, and likewise, from having their legs galled with the chain, when turning.

HENRY LARNARD.

Brighton, July, 1817.

We the subscribers hereby certify, that we have tried a machine, invented, by Capt. Luke Johnson of Leominster, for the purpose of drawing a plough; and from the trials we have made we are satisfied, that a considerable saving can be made by using said machine, as by the aid of it ploughing can be performed with about one fourth less number of cattle than without it, and we think it will prove a useful improvement, and recommend it to the notice of farmers.

January, 31, 1817.

WILLIAM NICHOLS,
LEVI NICHOLS, 2d.
PETER JOSLIN,
SILAS ALLEN,
JACOB FULLAM,
JAMES CARTER,
THOMAS ROBBINS,
DANIEL NEWHALL,

WILLIAM BASCOM,
BEZALEEL LAWRENCE,
SILAS RICHARDSON,
MOSES EMERSON,
PAUL WILLARD,
NATHAN WILLARD,
WALLIS LITTLE.

The subscriber hereby certifies, that he has tried a machine, invented by Capt. Luke Johnson of Leominster, for the purpose of drawing a plough, and from the trials he has made, is satisfied that a considerable saving can be made by using said machine, and thinks ploughing can be performed with about one fourth less team than without it. The plough runs more true than without said machine, and the hinder cattle are considerably favoured on the neck, by the chain not chafing, when turning.

EDWARD SPARHAWK.

Brighton, July 12th, 1817.

CATTLE SHOW AND EXHIBITION OF MANUFACTURES, AT BRIGHTON,

ON THE SECOND TUESDAY OF OCTOBER, 1817.

THE Trustees of the Massachusetts Society for the promotion of Agriculture, encouraged by the renewed patronage of the Legislature of this state, intend to bestow in premiums, not only the sum granted by the government for this purpose, but also the whole amount of the income of their own funds. They therefore announce to the public, their wish to have a Cattle Show, and Exhibition of Manufactures, at Brighton, on the second Tuesday of October, 1817; and they offer the following Premiums.

FOR STOCK.

For the best Bull raised in Massachusetts, of any age,	\$ 40
For the next best do. do. - - - - -	25
For the best Cow, not exceeding eight years old,	40
For the next best do. do. - - - - -	30
For the next best do. do. - - - - -	20
For the best Ox, fitted for slaughter, and weighing not less than 1800 wt. - - - - -	50
For the next best do. do. not less than 1500 wt. -	40
For the next best do. do. not less than 1300 wt. -	30
For the best pair of working Cattle, not exceeding eight years old - - - - -	40
For the next best do. not exceeding eight years old, -	30
For the next best do. of any age, - - - - -	20
For the best Merino Wethers, not less than six in number,	20
For the the next best do. - - - do. -	10
For the best native Wethers - - - do. -	15
For the next best, - - - - -	10
For the best Merino Ram, not less than three years old,	20
For the next best do. of any age, - - - - -	10
For the best Merino Ewes, not less than five in number, and two years old, - - - - -	30
For the next best do. do. - - - - -	15

For the best Boar, not exceeding two years old,	-	10
For the next best do.	-	5
For the best Sows, not more than four years old, and not less than two, and two in number,	-	10
For the best Store Pigs, not less than two in number, and not more than two years old,	-	10
For the next best do. do. do.	-	5
For the best Bull hereafter imported by a citizen of Massachusetts, having regard to the adaptation of the breed for meat as well as dairy,	-	100
For the next best imported do.	-	75
For the best milch Cow, imported,	-	75
For the next best do.	-	50

Any of the above stock, when raised, and still owned, at the time of exhibition, by the person who raised them, will entitle the claimant to an allowance of ten per cent. in addition.

FOR AGRICULTURAL EXPERIMENTS.

To the person who shall raise the greatest quantity of wheat on an acre, on a tract not less than one acre, specifying the nature of the soil and culture.	-	40
To the person who shall raise the greatest quantity of carrots, potatoes, or turnips, having regard to the quantity of land and mode of culture,	-	40
To the person who shall introduce any new vegetable or grass, and prove, by cultivation, its superiority to those now in use, or its being a good substitute for them,	-	30

INVENTIONS.

To the person who shall invent the best, simplest and least expensive machine for thrashing wheat or any small grains,	75
To the person who shall invent the best and simplest, and least expensive machine for sowing small seeds on an extensive scale,	30
To the person who shall invent the best plough for common purposes,	20
To the person who shall introduce the drill plough, and apply it successfully to the culture of any small grains or seeds,	20

To the person who shall produce at the show any other agricultural invention, which shall, in the opinion of the Trustees, deserve a reward, - - - - - 20

FOR DOMESTIC MANUFACTURES.

To the person or corporation who shall produce the best specimen of fine broadcloth, not less than six quarters wide, and 100 yards in quantity, from wool grown in Massachusetts, and manufactured within the same, - - - 50

To the person who shall produce the best specimen of broadcloth as aforesaid, not less than 100 yards, : - - 30

To the person who shall produce the best specimen of broadcloth as aforesaid, manufactured in his family, and not less than twenty yards, - - - - - 20

To the person or corporation who shall produce the best specimen of cotton cloth, manufactured in this state, not less than fifty pieces. - - - - - 20

To the person who shall produce the best specimen of any other fabrics of wool or cotton, or both, manufactured in this state, in public factories, - - - - - 20

In private families, - - - - - 20

It is understood, that whenever merely from a want of competition, any of the claimants might be considered entitled to the premium, under a literal construction, yet in the opinion of the Judges, the object, so offered, is not deserving of any reward, and is not superiour to many similar ones not offered, the Judges shall have a right to reject such claims.

Persons to whom premiums shall be awarded, may, at their option, have an article of plate with suitable inscriptions, in lieu of the money. Premiums will be paid within ten days after they shall be awarded. The rules and regulations of the Cattle Show will be made known some weeks before it will take place.

By order of the Trustees,

J. LOWELL, *Chairman of the
Committee for Premiums.*

MEMBERS ELECTED SINCE JANUARY, 1817.

[The name of John Parkman, Esq. of Brighton, and that of Daniel Parker, Esq. of Paris, an honorary member, were accidentally omitted in the list of members contained in the last No. of the Repository.]

NEW MEMBERS.

Hon. Daniel Waldo, *Worcester* ; Hon. Samuel Dana, *Groton* ; Mr. Robert Lapish, *Bangor* ; Mr. Nathaniel Chandler, *Petersham* ; Hon. William Abbot, *Castine* ; Mr. Isaac Locke, *West-Cambridge* ; Dr. Eliakim Morse, *Watertown* ; Marshall B. Spring, Esq. *Watertown* ; Hon. James Humphries, *Athol* ; Hon. William Moody, *Saco* ; Gen. Ebenezer Mattoon, *Amherst* ; Mr. Samuel G. Derby, *Weston*.

Note. The sum of *five dollars* is assessed upon each member on his admission, on payment of which to the Treasurer,* he will be entitled to receive all the publications of the Society, without further expense, during life.

HONORARY MEMBERS, NEWLY ELECTED.

Sir Joseph Banks, *Baronet* ; Sir Benjamin Hobhouse, *Baronet*---*President of the Bath Agricultural Society, in England* ; Nicholas Hammond, Esq. of *Easton, Maryland* ; James Wadsworth, Esq. *Canandaigua New-York* ; Herman Le Roy, Esq. *New-York*.

The price of the *Repository*, for the future, will be fifty cents each number.

Messrs. Wells and Lilly, Court-Street, Boston, will forward copies to any part of the United States, on receiving orders for the same, post paid.

* John Prince, Esq. Boston.

r-
d
.]

;
s-
t-
g,
m
el

er
ne
y,

as
q.

ts

rd
or

THEY HAD TO GO TO THE
HOSPITAL TO GET THE
CHILDREN.

